

3dcreative

Issue 076 December 2011

Mariano Steiner

3DCreative interview this fantastic 3D Sculptor.

Jose Alves da Silva, Arda Koyuncu & more!

Gallery - 10 of the best images from around the world!

"Jester"

Project Overview by Raphael Boyon

TOPOLOGY MASTERCLASS

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Cyborgs

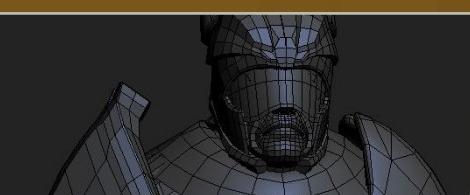
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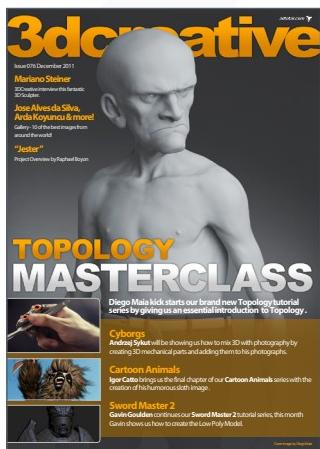
Cartoon Animals

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Sword Master 2

Gavin Goulden continues our **Sword Master 2** tutorial series, this month Gavin shows us how to create the Low Poly Model.





EDITORIAL

Well the festive season is here. I presume you are all busy preparing for Christmas, running around the shops finding the best deals you can and wrapping your gifts. Well perhaps you can spare a few moments to take a good look at this month's magazine which is riddled with treats and stunning tutorials.

This month's magazine see's the introduction of two new amazing tutorial series. The first series we will discuss is the series that has provided this month's cover image. Topology is a fundamental subject of 3D. If you want to be able to animate and manipulate your model you need to be working with clean topology. In this series Diego Maia will be showing us how to create clean topology and how to clean it up if your model requires it. In this issue he starts with an introduction to topology and shows us how to handle topology in some of the trickier areas.

The second of our new series introduced this month is quite different. Many of you will remember the excellent tutorials that have been created by Andrzej Sykut for us in the past. In this issue Andrzej is back to share a new technique with us. Andrzej will be showing us how to mix 3D with photography, using one of the trickiest subject matters to do this, the human body. By creating 3D mechanical parts and adding them to his photographs, Andrzej will be showing us how to create stunningly realistic Cyborgs.

This month's issue contains the final chapter in our Cartoon animal series which has been a real treat. The series will be wrapped up by Igor Catto who will be showing us how to create a cool sloth. Don't ask me why the sloth is swinging a bunny around his head, but it makes me laugh every time I look at it. Next month we will be starting an amazing new series about Sculpting Armored Beasts in ZBrush, you are going to love it!

In our SwordMaster Series Gavin Goulden is back and in this issue will be showing us how to turn our high poly sculpt into a games ready low-poly character. I hope you are enjoying this series and are following it step by step. I look forward to seeing all of your low poly characters when the series has finished.

In this month's interview we have caught up with Brazilian sculpter Mariano Steiner. Mariano is an amazing talented artist so you will

CONTENTS

What's in this month?



MARIANO STEINER

Interview - 3D Sculptor



THE GALLERY

10 of the Best 3D Artworks



CYBORGS

Chapter 1: Human Hand



CARTOON ANIMALS

Chapter 6: Sloth



TOPOLOGY

Chapter 1: An introduction to Topology



"JESTER"

Project Overview by Raphael Boyon



"FISH MAN"

Digital Art Masters: Volume 6 - Free Chapter



SWORDMASTER 2

Chapter 3: Low Poly Model



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love looking at his cool sculpts and images. Equally cool this month is our Making Of, which features the work of Raphael Boyon, who shows us how he created his cool image of a jester.

As well as amazing tutorials this issue features stunning work by the likes of Nikita Volobuev, Jose Alves da Silva, Bertrand Benoit and many more talented artists.

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Mariano Steiner

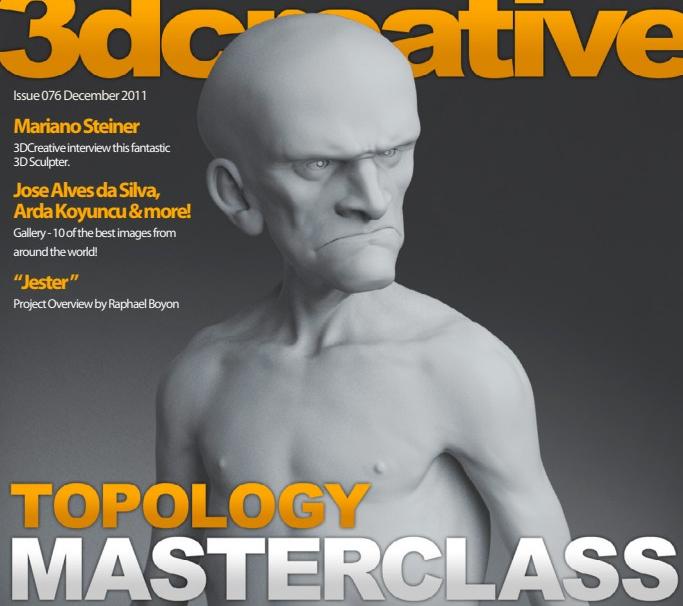
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Cover image by Diego Maia

SETTING UP YOUR PDF READER

For optimum viewing of the magazine, it is recommended that you have the latest Acrobat Reader installed. You can download it for free, here: [DOWNLOAD!](#)

To view the many double-page spreads featured in 3DCreative magazine, you can set the reader to display 'two-up', which will show double-page spreads as one large landscape image:

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Get the most out of your Magazine!

If you're having problems viewing the double-page spreads that we feature in this magazine, follow this handy little guide on how to set up your PDF reader!

Mariano Steiner

Mariano is a name of Market 3D sculptor Prof. Brasil, who has been working in the field of 3D modeling and animation for about 10 years. He has created several award-winning projects, including the 3D model of the "Jester" and the "Mariano Steiner" series.

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CONTRIBUTING ARTISTS

Every month artists from around the world contribute to 3DCreative, and you can find out a little more about them right here! If you'd like to get involved in the 3DCreative magazine, please contact: simon@3dtotal.com



GAVIN GOULDEN

Gavin Goulden is a character artist for Irrational Games working on Bioshock Infinite. With 6 years games industry experience, he has contributed character and environment art assets to multiple titles including Dead Rising 2, The Bigs 2, Damnation and FEAR 2.



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gavin@gavimage.com



ANDRZEJ SYKUT

When it comes to CG, Andrzej is a bit of a generalist, but lighting is where the fun is for him – that, and post-production/compositing. He currently works at Platige Image, and also does some freelancing as well. While he enjoys his work, it's also time-consuming, so he tries to get away from the computer as often as possible to enjoy the world. <http://azazel.carbonmade.com/> eltazaar@gmail.com



IGOR CATTO

Born in Brazil, Igor Catto studied at Melies School of Cinema and Animation where he discovered a passion for Modeling. After a brief time at Glaz Cinema as a Character Modeling, Igor was hired at Graça Filmes as 3Dmodeler and is available for freelance work. <http://igorcatto.blogspot.com/> igorcatto@gmail.com



DIEGO MAIA

Diego Maia is a freelance 3D modeler and concept designer from Brazil. He has worked for some of the biggest advertising companies in Brazil, and has also been teaching drawing classes at Melies School for three years.

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WOULD YOU LIKE TO CONTRIBUTE TO 3DCREATIVE OR 2DARTIST MAGAZINE?

We are always looking for tutorial artists, gallery submissions, potential interviewees, 'making of' writers, and more. For more information, please send a link to your portfolio, or send examples, to: simon@3dtotal.com

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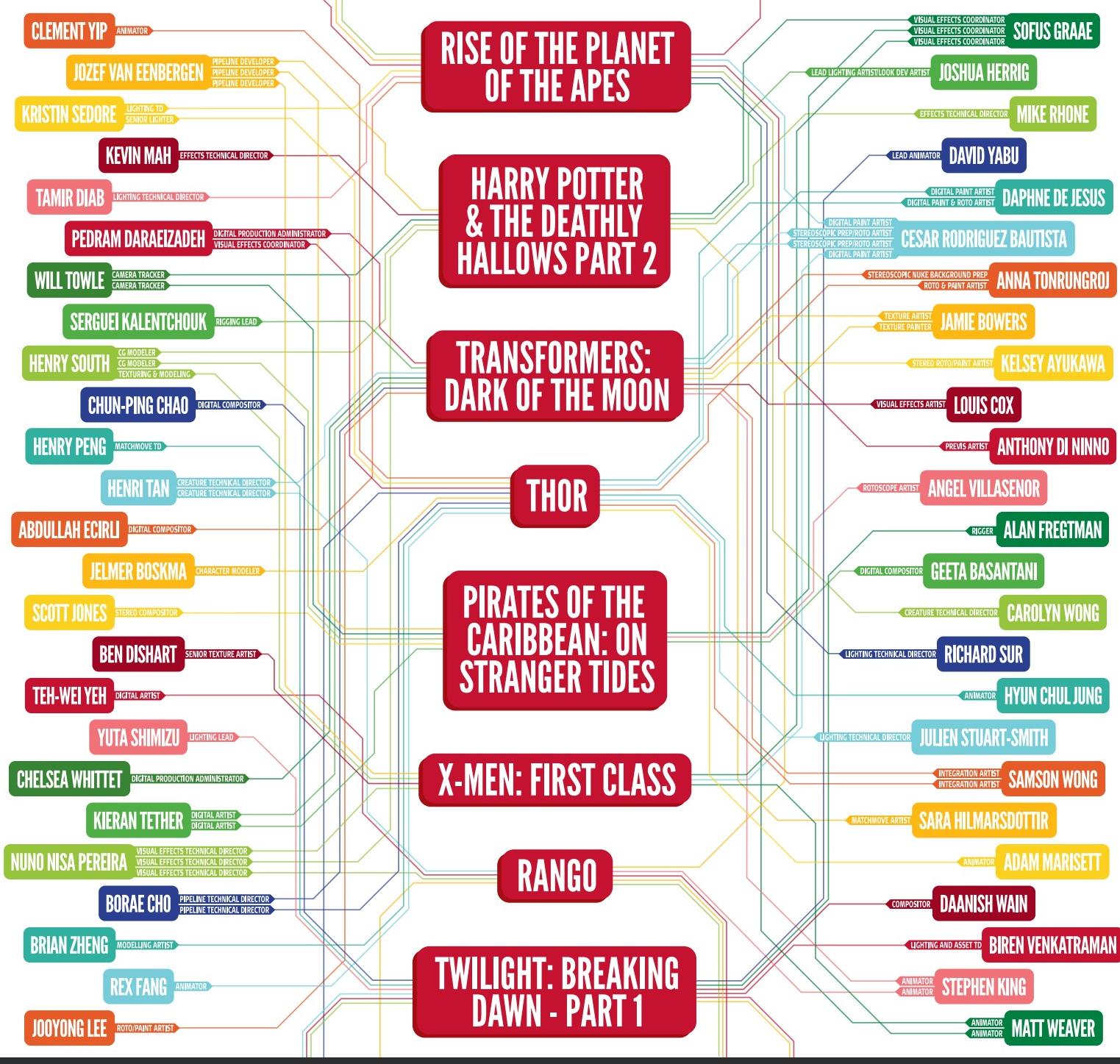
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Mariano Steiner

Mariano is a stunningly talented 3D sculpter from Brazil with a history of freelancing in the advertising industry. In this article he talks about the state of the CG industry in Brazil and what being a ZBrush Beta testeter involves. You'll also have the chance to check out his excellent portfolio!



“UNDERSTANDING ANATOMY REQUIRES PURE HARD WORK. I STUDY ANATOMY EVERY DAY AND I TRY TO PAY AS MUCH ATTENTION AS I CAN TO IT. IT'S THE MOST IMPORTANT ASPECT OF A WELL BUILT CHARACTER.”

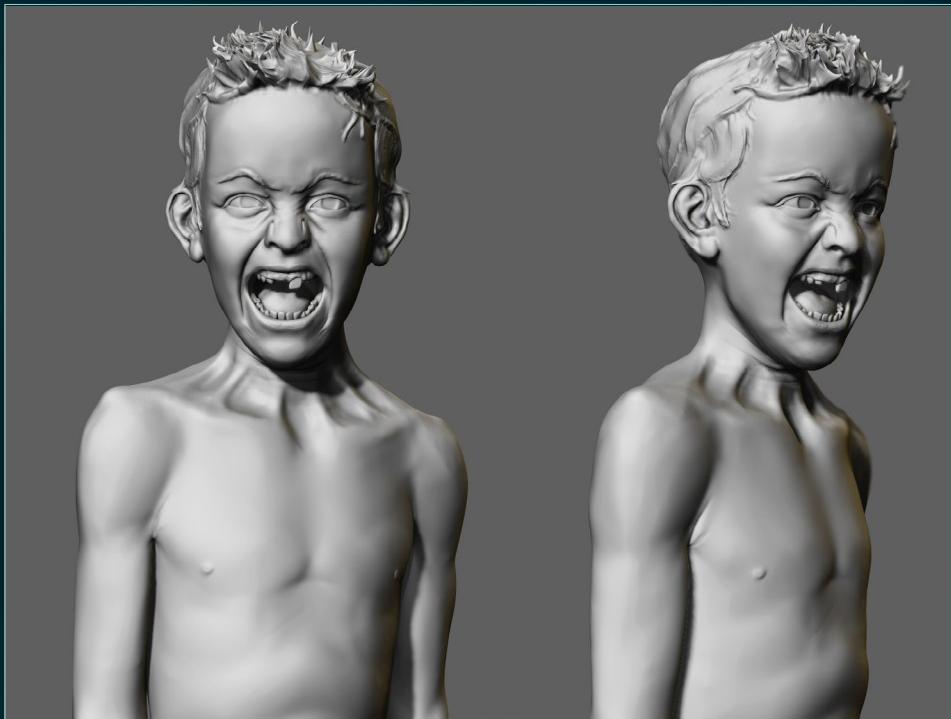
Apart from the fact that you are from Brazil and that you use ZBrush, I know very little about you. Can you tell us a little about yourself and how you got into the CG industry?

Well, I've been a CG artist for about three years now, but I've been connected to art since I was a little kid. I started by drawing from comics such as *Spiderman* and *X-Men*. I also drew the characters from TV cartoons like *DragonBall Z* and *Yuyu Hakusho* etc. I have always been into movies and video games, so for me it's a dream come true to work in the CG industry.

"THE PIXOLOGIC TEAM ARE ALWAYS A FEW STEPS AHEAD. THEY ALWAYS RELEASE IMPRESSIVE NEW TOOLS AND THEY ARE A GREAT BUNCH OF PEOPLE."

Can you remember what it was that made you decide to become a 3D artist rather than 2D? Was it a film, a particular artist or something else?

That is a good question. I think that video games made me prefer 3D. When I was choosing career paths I didn't know how a 2D artist would fit into game or film production. But 3D was obviously involved. So it was kind of a natural choice. I've never really seen it as a decision between 2D and 3D.

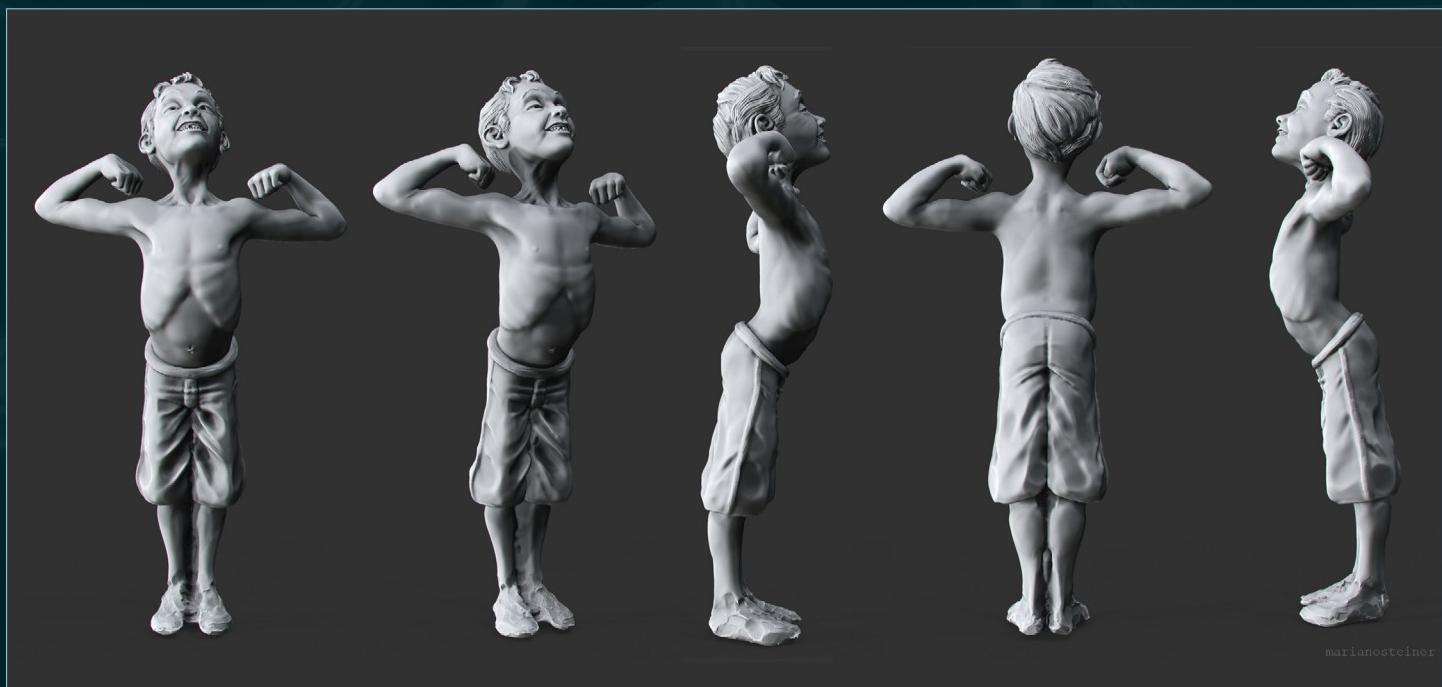


I notice that you have been a ZBrush beta tester a few times. Can you tell me what your favorite advances in the software have been and what being a beta tester entails?

That is right, this has been my second year as a ZBrush beta tester and I must say I feel really honored to be involved. ZBrush is a hugely important piece of software, which has drastically changed the film and games industry and so it is a privilege to be involved in the testing of it.

The Pixologic team are always a few steps ahead. They always release impressive new tools and they are a great bunch of people. I really can't say what I like the most, because I like it all! That said I really like the new R2 upgrade, it is mind-blowing. Dynamesh is the future of 3D concepting.

Being a beta tester is fun actually. We chat a lot with the other beta testers and the Pixologic team, searching for bugs or errors to prevent





problems with the final release. And of course, we get to see every new feature before everyone else.

"SHOWTIME IS A TRIBUTE TO THE AMAZING ARTIST RICHARD MACDONALD. I'M VERY INSPIRED BY HIS WORK"

You have a brilliant portfolio of work, but the image that stands out to me the most is *Showtime*. Can you tell me a little bit about the image and what it was that made you decide to sculpt it?

Thanks! *Showtime* is a tribute to the amazing artist Richard Macdonald. I'm very inspired by his work, and I was fortunate enough to visit one of his galleries in Las Vegas last year. To be honest it made me feel like a little bee in a large forest. His work is impressive in every way, so I decided to reproduce one of his works (or die trying).



Is traditional sculpting something that you have tried before?

I have tried it before, but it's very different to using 3D so I need to practice it more to develop my skills. Right now I'm focusing on my 3D art, but I'll definitely give it more attention in the future.

You seem to have a fantastic understanding of human anatomy. Did you study specifically to achieve this or is it something that has developed over time through observation?

Understanding anatomy requires pure, hard work. I study anatomy every day and I try to pay as much attention as I can to it. It's the most important aspect of a well-built character.

What are the opportunities like for a CG artist in Brazil? Do you find that you do a lot of work for international clients?

Here in Brazil the games and film market is a little baby compared to the USA. The industry



is starting to grow here, but most of the CG industry in Brazil is focused on advertising. As a freelancer the opportunities for a Brazilian artist are growing a lot. We have some amazing 3D and 2D artists here and I'm sure they have plenty of work.

"IN BRAZIL PEOPLE STILL HAVE THAT PRECONCEPTION THAT ART IS NOT A REAL PROFESSION"

I have to admit that I speak to a lot of artists, both 3D and 2D, that come from South America. Is there something in the culture that encourages the growth of artists?

Yes! The fact that we have no encouragement at all! In Brazil people still have that preconception that art is not a real profession and a lot of people don't even know that you can make a living out of it. It's getting better now, with several new talented artists having emerged recently, but the art industry here is still very poor.

I always like to ask CG artists what they like to do when they get some time off. What do you do when you get chance to tear yourself away from the computer screen?

Honestly that doesn't happen very often. But when it does I have my family, my girlfriend and my friends to hang out with. And I'm also a musician.



You must have reached a lot of your goals already, but do you still have some targets you would like to reach or any projects you would like to work on?

Sure! I used to have very low level aspirations and I don't make plans like, "I want to be working at Disney in 15 years time." I always think one year at the time. Currently there are a few companies I would love to work with, like The Aaron Sims Company, Digital Domain, Digic, Blur.... maybe Pixar and DreamWorks.

It has been a pleasure catching up with you. I look forward to seeing more of your work in the future.

Thanks a lot for the interview! It was fun and a great pleasure.

MARIANO STEINER

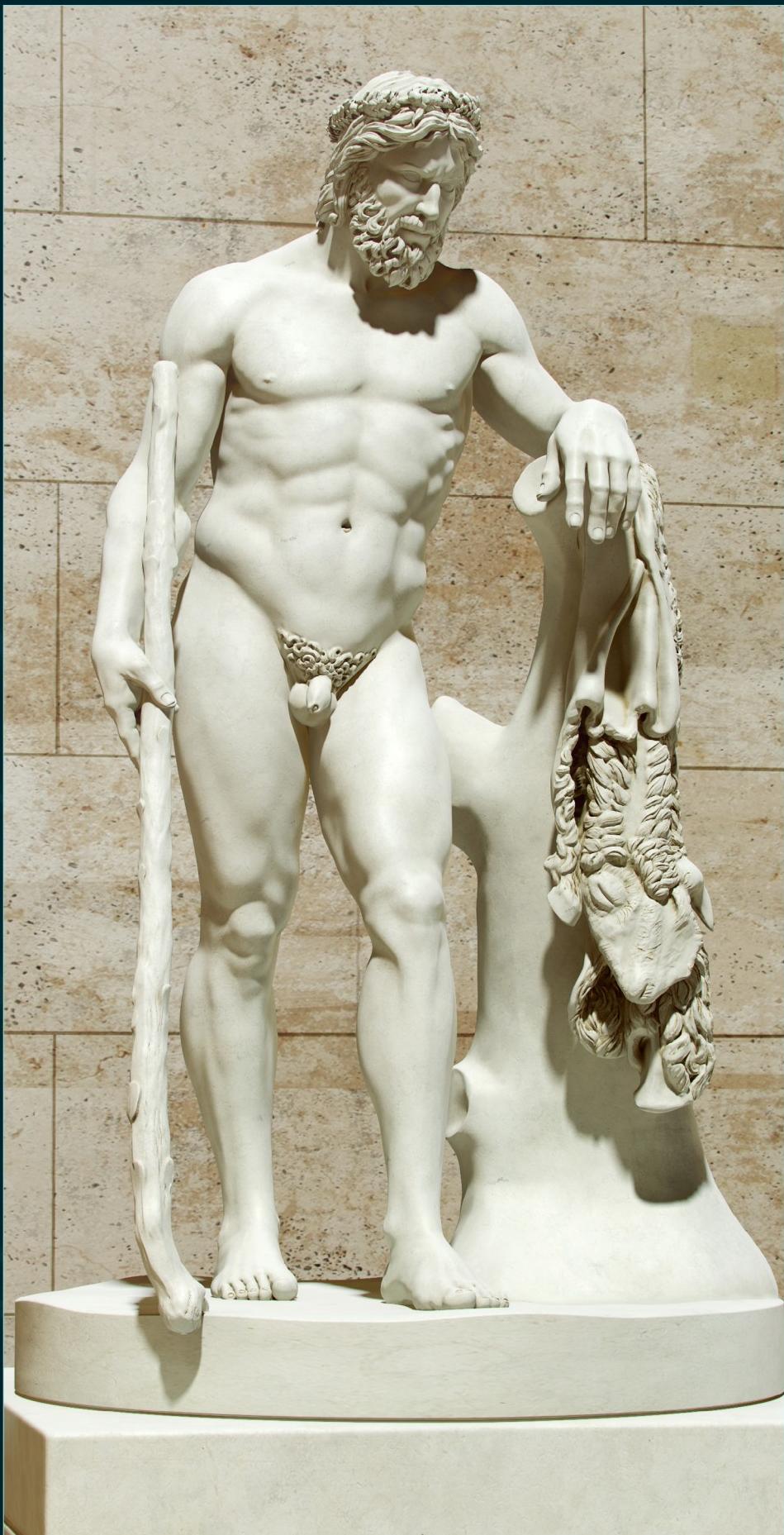
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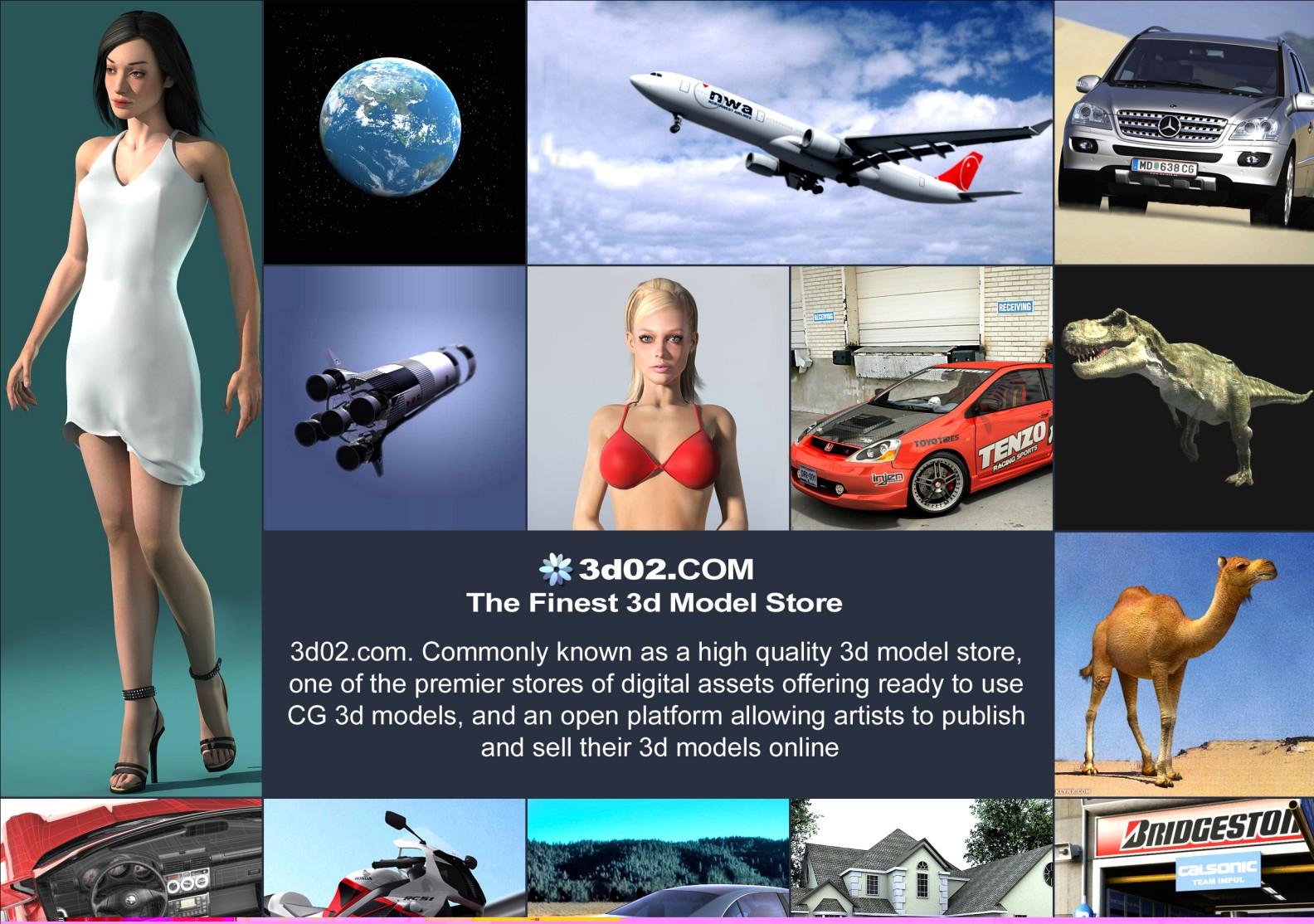
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Interviewed by: Simon Morse



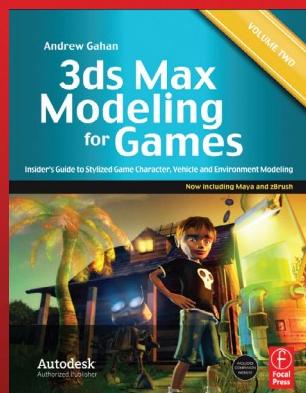
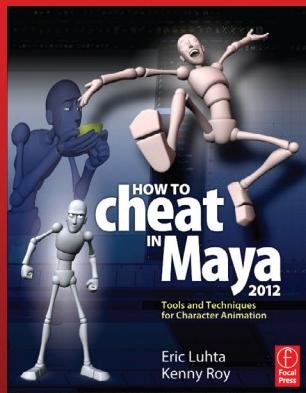
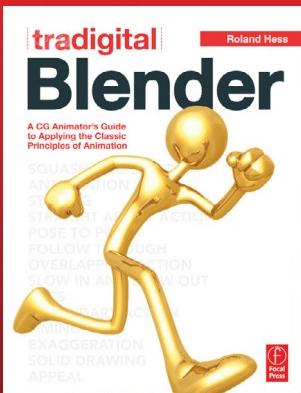


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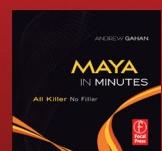
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Cristian Rio

Anatoliy Sidorov

Arda Koyuncu

Brian Baxter

Jose Alves da Silva

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metrocubicodigital

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SWORDMASTER 2

CHAPTER 3 - LOW POLY MODEL

In 2006 3DTotal created some groundbreaking training that quickly made a name for itself as one of the best 3D training resources available; that series was called the Swordmaster! Well five years later the Swordmaster is back and better than ever. In this series industry professional Gavin Goulden will be talking you through how to take a concept and turn it into a top quality character ready for use in a game. From basic modeling through to sculpting and texturing, Gavin will cover every step in great detail so that even an inexperienced 3D artist will be able to comfortably follow this series.

FOLLOW THIS
TUTORIAL SERIES ON
PAGE 062



COMING UP IN THIS ISSUE...

This month Gavin Goulden will show you how to create the low poly model.

So if you're interested in seeing the third chapter of this great series, please flip to the back of this magazine and enjoy.

 3DS MAX - PAGE 062

 MAYA - PAGE 080

CYBORG

MIXING 3D & PHOTOGRAPHY



Mixing 3D and photography is a real skill and you've probably seen it attempted with varying results. In this series Andrzej Sykut will be showing us how to achieve the perfect blend of 3D and photography with the coolest of subjects: cyborgs. When approaching this task there is a lot to consider. Firstly you must think about the photograph and the lighting you want in your image, then you have to think about how you will create the 3D in the image, and once you have this you will need to create the same lighting on the 3D aspect as in the photograph... the list goes on and on. Tackling this without direction would be difficult, but with the help of these tutorials you can come up with some stunning results.

THIS ISSUE Chapter 01 | Human Hand | NEXT ISSUE Chapter 02 | Sunglasses
FEBRUARY ISSUE 078 Chapter 03 | Power Plugs | MARCH ISSUE 079 Chapter 04 | Spy Snail

CHAPTER 01 - HUMAN HAND

Software used: 3ds Max

INTRODUCTION

In this tutorial I will be sharing the techniques used to create an image composed of 3D and photography. I have divided the process into five stages: concepts, photography, 3D modeling, 3D layout, and rendering and compositing. These stages will overlap quite a bit as I will be doing shader tests whilst modeling and bits of compositing at the same time. Nevertheless separating the different processes will make it easier to organize the information.

CONCEPTS

My starting point was to think of a cybernetic addition to the hand. All kinds of images start to come into your mind when thinking about this kind of thing, such as the robotic hand of the Terminator, which was covered in bloody tissue, Luke Skywalker's burned prosthetic and Robocop's face (it's the only place where you see the flesh/metal boundary). Most of the time, the fusion of human tissue and metal looks brutal. I wanted something slightly different.

I did some research on modern prosthetics, which are getting rapidly amazing. There are mind-controlled limbs that provide tactile feedback, a bit like things you see in science-fiction. One thing that modern prosthetics have in common is the material. They are rarely made of metal and are usually made of some kind of composite polymer. Although modern prosthetics can do amazing things, they don't look that great yet.



01

This is where the idea started to hatch. How will these prosthetics look in a few years when the technical issues are solved and aesthetics start to become important? Carbon fiber is already in use because of its practical, mechanical qualities, but it also has quite cool aesthetic qualities. Just take a look at modern supercars.

I decided to create a hand with a couple of new, high-end carbon fiber fingers, which looked mildly futuristic, somewhat elegant and potentially possible at the same time. I wanted to emphasize the precision and dexterity of the prosthetic fingers, which is why I chose to have the hand holding a scalpel.

PHOTOGRAPHY

With the help of my brother I set up a very simple shoot in a dark basement (to get the almost black background I wanted). The main light was behind and above my hand, the fill was provided by an overhead fluorescent light (pretty weak), and a silver reflector on the right side (**Fig.01**). That was basically it for the photography setup.

The next step was to go through some trial and error to find a nice pose and position for the scalpel etc. Once we had played with this for a while I had some usable photos, of which I chose the best one and flipped it horizontally.

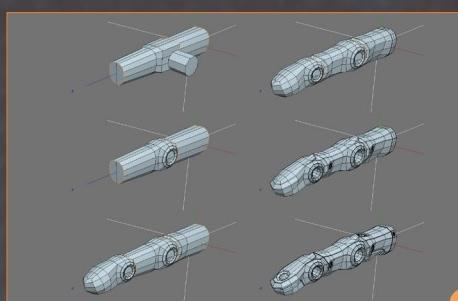
Later in the process I cropped and recomposed the photo very slightly, cleaned up the scalpel (using the Healing Spot brush in Photoshop) and enhanced the reflections a bit.

I used an old, manual 50mm lens attached to a Nikon DSLR, giving it approx 75mm focal length. While I could have created some HDRs for reflections and lighting, I decided to skip that stage as the light setup was quite simple and should be easy to recreate by eye. However, if I had been shooting outdoors I would have tried to capture as much environmental information as possible.

3D MODELING

This stage happened simultaneously with planning the shoot. It's pretty straightforward. I used box modeling in Wings 3D. **Fig.02** shows the progress of the model. It needed some slight tweaking afterward to match the real fingers. The tweaking that was done was mainly the shortening of the middle segment.

At the end of the modeling phase I imported the model into 3ds Max, set up a very simple shader and started to throw some lights at it. It's a great way to see if there is any additional detail needed, if the surface curvature is right and if the reflections are working nicely.



02

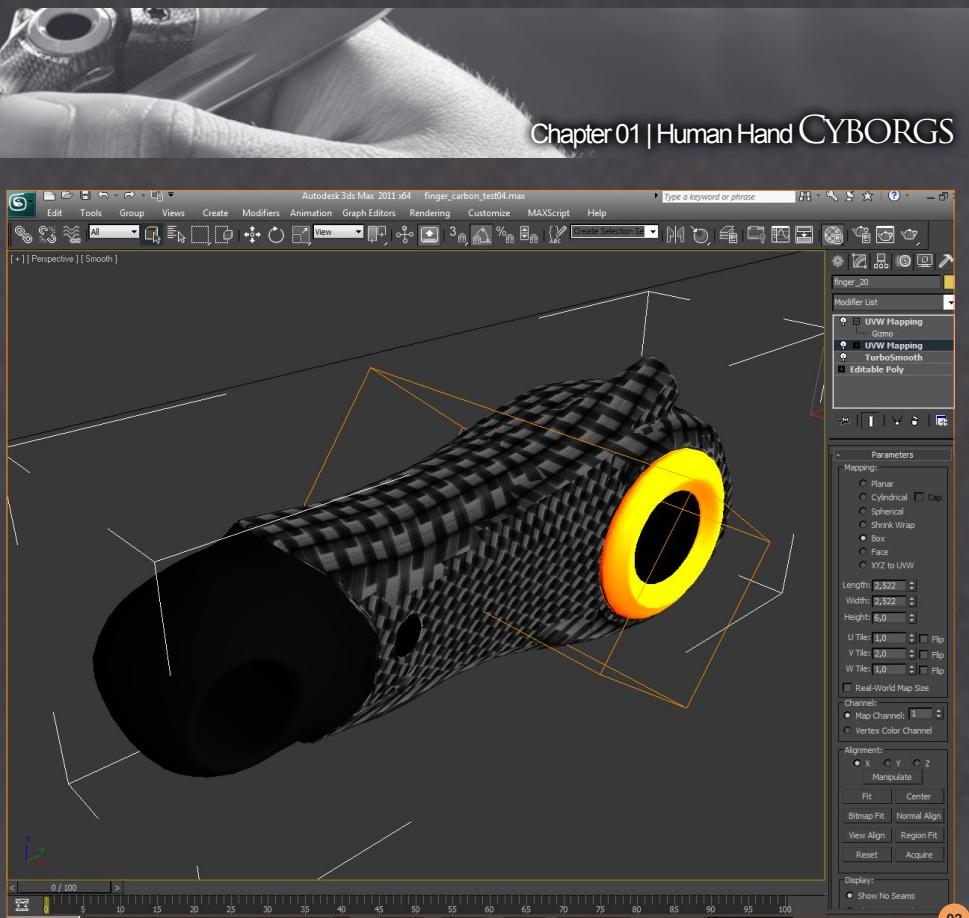
3D LAYOUT AND RENDERING

I used a combination of 3ds Max and V-Ray for the layout and rendering. The first important step was to match the camera and object positions. For this image that was done by eye. This was mainly because there wasn't much for camera matching software to work with. There are no three-edged corners and no planes, so this was the only option. Of course this wouldn't work if it was animated, but for a single still image, it was good enough.

I did know some of the parameters, like the camera focal length, which I typed in. I then tried to place the camera roughly in the right position in relation to the finger. I tweaked the finger orientation and rotated the segments to



04



03

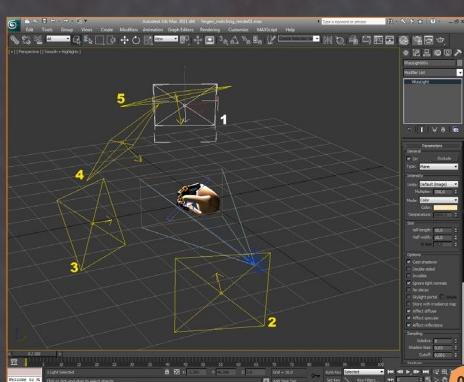
match the pose from the photo. To make this job easier, the finger segments had pivots aligned with the real pivot locations and were parented into a simple FK setup.

From this point onwards it was an iterative process; tweak the camera, tweak the fingers then tweak the camera again. When in this situation you will need to go through this process until the tweaks get smaller and smaller and it starts to look good. For a simple scene like this it shouldn't take that much time. Having the camera and fingers positioned, I created some simple geometry to represent the real hand and scalpel, and to provide some shadows and reflections on the CG fingers. It's all invisible to the camera, of course.

Simultaneously I was working on shaders, textures and lights. One shader worth mentioning is the carbon fiber material. I built it the way real carbon is made, with a base layer of carbon weave and strong bumps to bring out the fabric detail. There was also a shiny, reflective, clear coat on top, with another layer on the very top for the text and markings (**Fig.03**).

A happy accident happened when doing the test renders. I just used simple box mapping for the texture. As it turns out, if you resize and rotate the gizmo a bit, the texture placement actually looks very similar to real-life carbon fibre. It's one of the very, very few cases when UV seams and texture stretching are of any use (**Fig.04**).

The light setup was quite simple and you can see it in **Fig.05**. Firstly there is the key light (1), above and behind the hand. It actually acts as a rim light as well. Then there is a fill light (2), positioned to match the lighting from the photo. There is a little trick you can use here. Create a sphere roughly in the center of the image and use the Place Highlight tool to put the light in the right place, corresponding with the specular highlights on the skin. This way, matching things like the warm light on the tip of a middle finger is an easy job (3). Finally there's an additional rim light for the left-top facing parts of the fingers (4 – 5). All the lights are mapped with gradients, either linear or radial. This way the reflections they produce look more studio-like.



05

I used GI and a diffusely-convoluted HDRI map to provide additional fill lighting, and a high-resolution HDRI to generate nice reflections.

The reflection map has been rotated, so the reflections show up in the right places. Color mapping was set to Exponential, so it doesn't blow out the highlights.

To see the progress, let's take a look at the sequence of WIP images I saved during the project (**Fig.06**). See if you can spot the changes between the images.

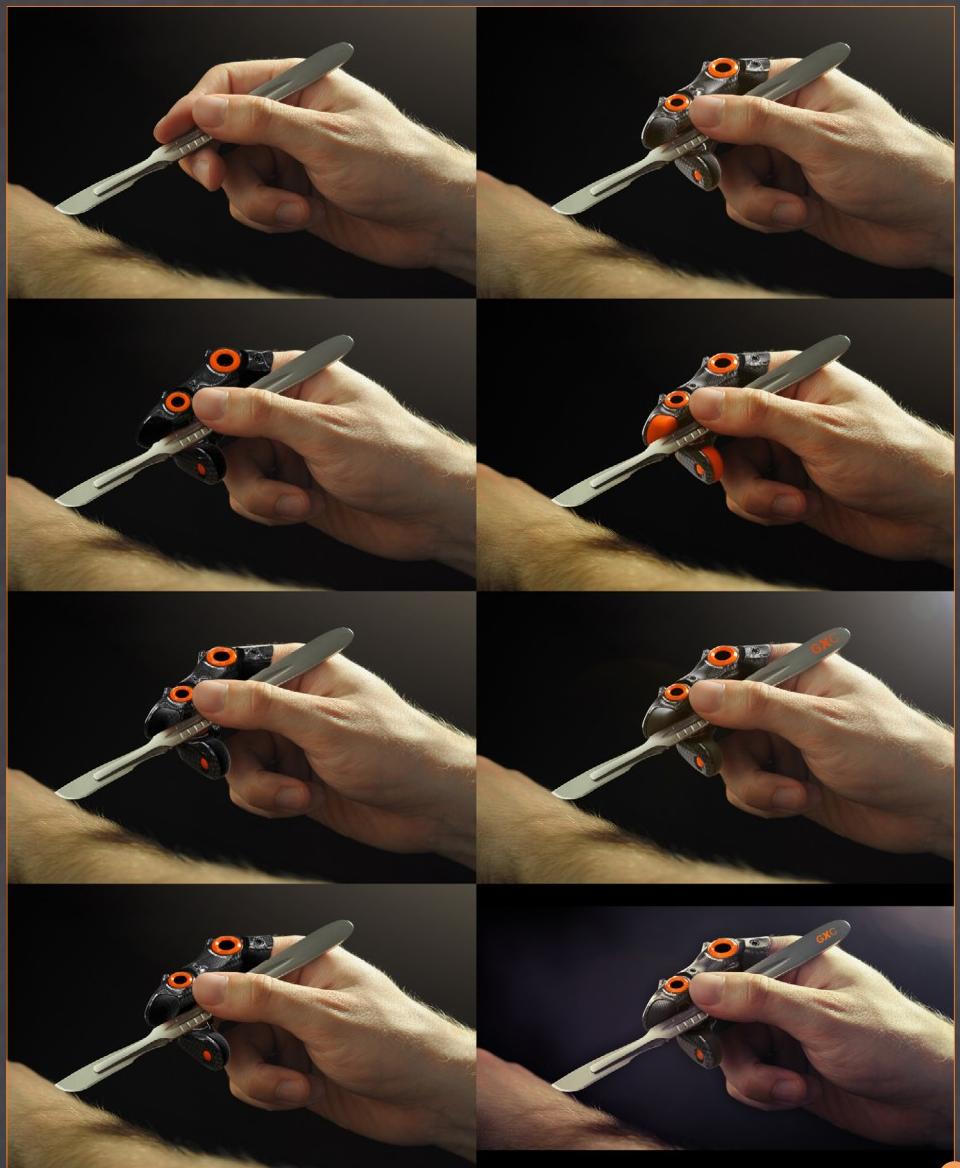
When I was happy with the preview renderings I started working on a high resolution render. I had a bit of a setback here because in full-size a slight lack of surface detail became apparent. This was fixed in two ways. First I added another layer of dirt to most of the materials, with a fine texture of spots and scratches. I also added to or increased the strength of the bump mapping in places. The second way was another render pass, containing three various textures in the R, G and B channels, occlusion, spots and anisotropic specular, modulated by tiled scratches, all to be added in compositing. All in all these were subtle changes, but important when you look at the image when it is large and at full size.

COMPOSITING

There were many little steps involved with compositing this image. The first one is masking. I used a layer mask to hide parts of the CG fingers that should be occluded by real elements. For a still image it's the fastest way, but this is not the case for an animation. I also used the Clone Stamp tool to remove the portions of the real fingers visible behind the CG ones.

The next crucial step was matching the brightness and contrast levels in both the photo and CG elements, and matching the colors. This was done using Curves adjustment layers. I added some contrast to the photo and boosted the shadows on the CG a bit.

Another important thing is matching the depth of field. Although subtle, blurring was present and



06

needed to be taken into account. I rendered a ZDepth pass and fed it to the Lens Blur filter. It took a few tries to get the blur amount right, but in the end it matched. The same treatment was necessary for the VrayReflections pass, which I added on top to make the reflections "pop" more.

Then came the polishing tweaks, like adding some blurred smoke in the background, adding a bit of glare in the top-right corner and removing skin-toned finger reflections from the scalpel. I also added an orange logo to the handle (to tie the photo and CG in better, since now both had strong orange accents). I added the additional rendered dirt and specular passes to the CG fingers and painted in some shadows

(mostly, the shadow of the scalpel on the CG fingers and darkening the bottom finger behind the scalpel). Finally I painted in greenish fringes/grows on the edges of the CG parts.

To tie both parts better, I took a look at the Channels palette and noticed there was quite a bit of noise in the blue channel of the photo. Needless to say, I added something similar to the blue channel of the CG part. You don't even notice it unless you look into Channels, but it's there. I also added some grain over all the channels later on.

The boundary between flesh and prosthetic is always a challenge. I didn't want anything gross or ugly, just a clean, painless joint (it was very

important for me that the cyborg addition looked comfortable). Fortunately the boundary was quite small in relation to the rest of the image. Still, the best way to make it work was finding an existing feature that I could use to “anchor” the prosthetic; in this case a skin fold in the middle of the first finger segment. Then it was just a case of darkening the skin in the whole area and painting in some shadows and highlights, both on the skin and on the CG part. In the end the boundary didn't draw too much attention to itself, which is what I wanted. This method is (again) almost completely useless for animation, but very fast and efficient for still images.

A final touch was the global color correction. This is a subtle modification of Curves, with the blue curve being shaped into a very shallow S shape, which adds a hint of color to the highlights and shadows separately. I also added some vignetting to darken the corners of the image (**Fig.07**).

ANDRZEJ SYKUT

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CARTOON ANIMALS

Creating cartoon animals is a great starting point for anyone who is thinking about having a go at 3D. Cartoon animals are usually made up of shapes and forms that are fairly simple to model and since realism is not the focus of this kind of work, it gives you an opportunity to be expressive and experimental at all points of the creative process. In this series our artists will be talking you through how to approach this task, firstly by concentrating on how to create your idea, but then moving on to the modelling, texturing and post-production. Each chapter provides you with an opportunity to see into the workflow of these industry professionals who will give you a priceless insight into what is a huge part of the CG industry.



6

JULY ISSUE 071 Chapter 01 | Mosquito AUGUST ISSUE 072 Chapter 02 | Emu SEPTEMBER ISSUE 073 Chapter 03 | Armadillo

OCTOBER ISSUE 074 Chapter 04 | Squid NOVEMBER ISSUE 075 Chapter 05 | Scorpion THIS ISSUE Chapter 06 | Sloth

CHAPTER 06: SLOTH

Software used: 3ds Max, ZBrush, Photoshop

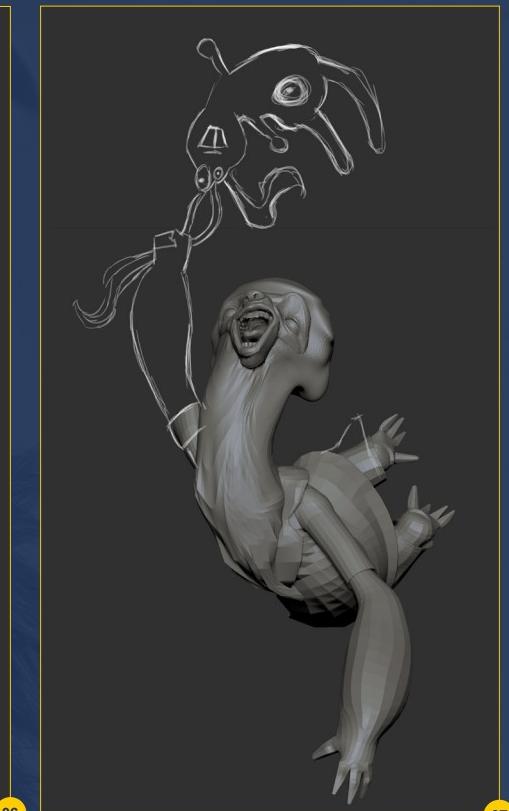
I was asked to design and model a cartoon sloth. I started to have a few ideas that I liked so I decided to work on the design directly in ZBrush. I did, however, create a very simple base mesh in 3ds Max with good topology before I went into ZBrush. This was to avoid having to rebuild the entire model (**Fig.01**).

I looked for some references on the internet and began to take the shapes from the references and apply them to the model to ensure that the overall shape of the sloth was accurate. All of these details were added in ZBrush (**Fig.02**).

As I said, some parts of the model had to be rebuilt. One of the areas I rebuilt was the face. Most of the base mesh, however, was fine. I then retopologized the model in 3ds Max and ZBrush (**Fig.03**). Whilst I had the mesh in 3ds Max I tidied up the model further until I had all parts of the character's body. I knew I could use this later when I posed the sloth.

To make the sloth's clothing I simply selected the polygons in the areas of interest and detached them so that I could turn them into the clothing later (**Fig.04 – 05**). These selected areas were further developed and refined later.

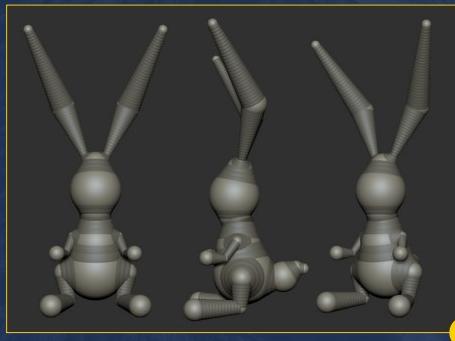




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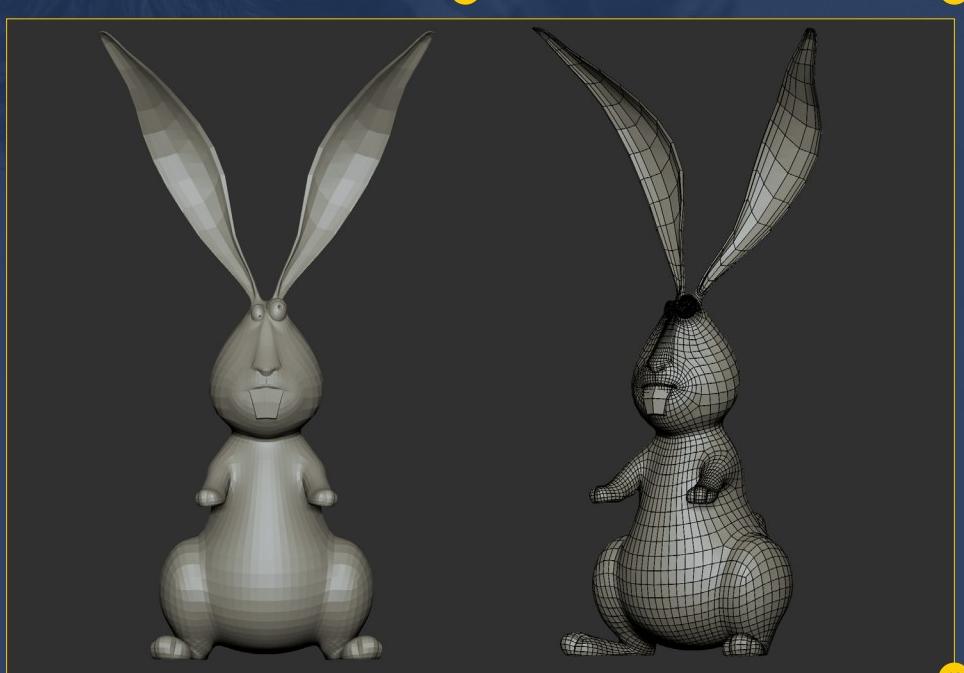
It is important to think about the final image and composition early in the process. I took a good look at some references to help me design and settle on the pose. I also looked very carefully at the silhouette of the image and the expression on his face, as they were very important when helping to see the final image design (**Fig.06**).



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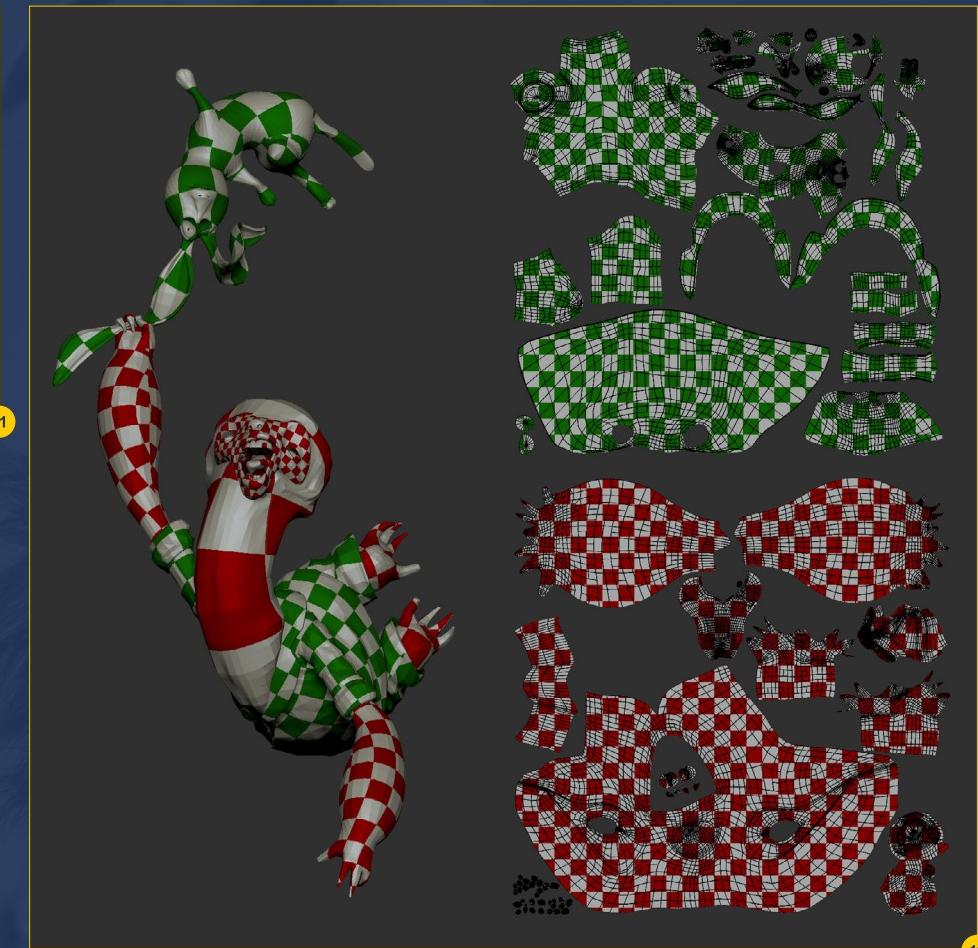
I then used screengrabs taken when looking at the model in ZBrush to further develop my overall idea and give the piece more direction. I did this by simply drawing over the screengrab in Photoshop. I had an idea, which was to show the sloth in the scene with a rabbit. I thought this was quite a good comical element as the sloth is a slow creature and the rabbit is much faster, yet in this scene the sloth is looking much more energetic (**Fig.07**).



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Once I had the sketch of the rabbit, it was pretty easy to make. I started off using ZSpheres in ZBrush to create a simple base. I then refined the rabbit until I was happy with it (**Fig.08 – 09**).

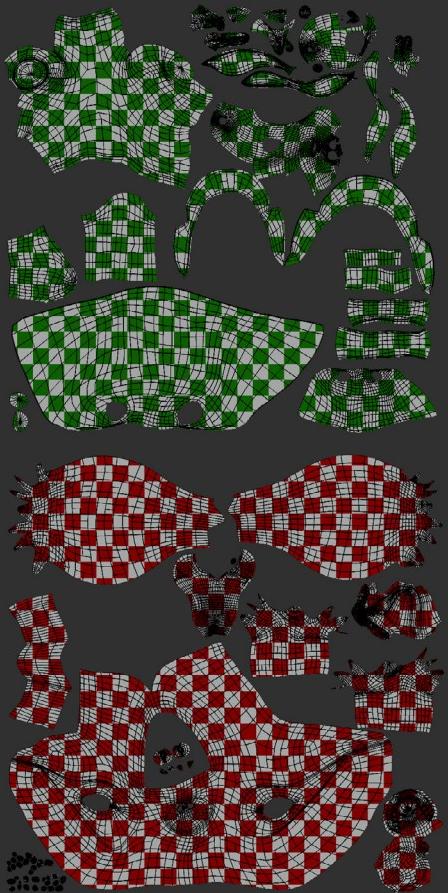
After cleaning the model up (**Fig.10**) I added it to the scene with the sloth and integrated the



characters together (Fig.11). When the two models were together I noticed that some of the polygons were too stretched, so I added a few cuts so that the pose worked better and the texturing would be easier.

Once the topology on the model was ok I created separate UVs, making it easier to texture the model. I created separate UVs for the body and for the clothing (Fig.12).

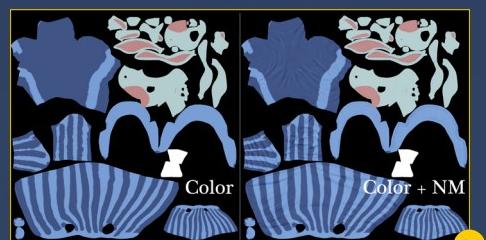
After I had done that I decided that there certain elements I wanted to detail further in ZBrush,



such as the clothing, so that I could create some useful maps. I didn't want to overcomplicate the design so I didn't create too much detail and left parts such as the face the same. At this point the modeling was pretty much done (Fig.13).

For the texturing I started by doing a quick base layer in Polypaint (Fig.14). I then exported a Diffuse and Normal map. I desaturated the Normal map and applied it to the Color map. I put the opacity all the way down to 20% and applied Multiply mode just to give the textures a little more volume (Fig.15).

I added a few photo textures in Overlay blending mode to complete the Diffuse map. From this



map I could extract the Specular and Bump maps. It's a good for the Bump map to retain some texture information. For the Specular map you must think about the glossiness of the material. In this case the clothes have almost no glossiness (**Fig.16**).

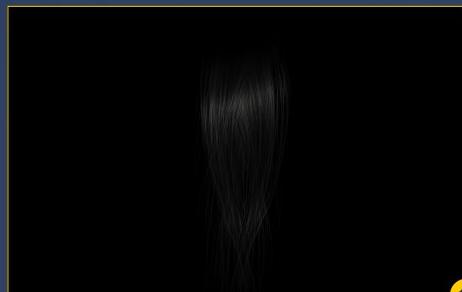
The application of the maps and shaders was fairly simple. For the clothes I used the standard shader with Falloff. For the body and eyes I used Mr Arch & Design. Once this was done all of the maps (Diffuse, Bump, Specular and Normal) were completed.

To help design the flow and direction of the fur I took another screengrab from ZBrush and took it into Photoshop where I could sketch on the hair and find something I was happy with (**Fig.17**).

To create the hair I created a new Photoshop file (approximately 1024 x 1024) and filled the document with black. I then took a small brush (about 3px wide) with a hard edge and started to draw in the individual hairs (it is important to give the impression of overlapping hairs) (**Fig.18**).

This newly created map will work fine for both the Diffuse and Opacity maps, however you will have to adjust it for the Specular map. To do this simply adjust your original image and try to make it look as if light is hitting appropriate areas (**Fig.19**).

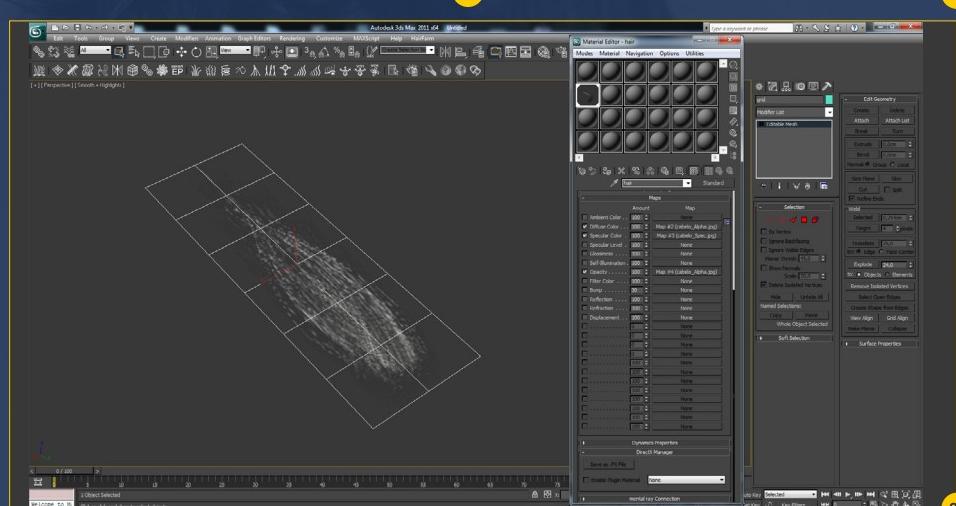
I then went back into 3ds Max and applied all three of the maps to a standard material. I added them to a simple grid with a few cuts through it so I could give more volume to the hair later (**Fig.20**).



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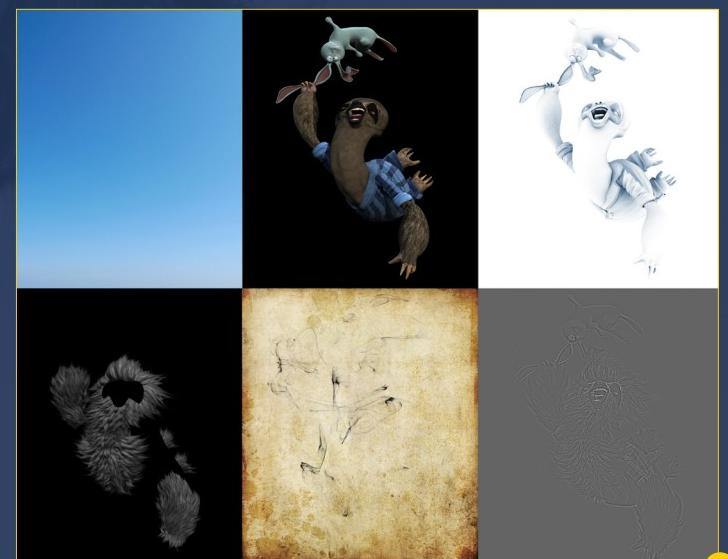
The next step I took was to duplicate this new item in all the appropriate areas to match the design that I came up with earlier. To make it easier to overlap the hair I added it from the bottom to the top (**Fig.21**).

You can see the hair effect in **Fig.22**.

For the rendering two passes were made: one for the body and one for the hair. The hair color was going to be created later in the process using Photoshop (**Fig.23**).

HDR lighting was used (from a standard 3ds Max file) with a point light to simulate sunlight. For the final composition I used a gradient background to simulate the sky and to blend both passes. A dirty pass was added to make the image look like an old photo taken with a dirty camera lens. The Ambient Occlusion and Depth of Field maps were done by hand (**Fig.24**).

You can see the final image in **Fig.25**.



Thanks for reading how I created my cartoon animal. If you have any questions about how I created the image get in touch with me by email.

I am happy to help.

IGOR CATTO

For more from this artist please visit:

<http://igorcatto.com/>

Or contact him at:

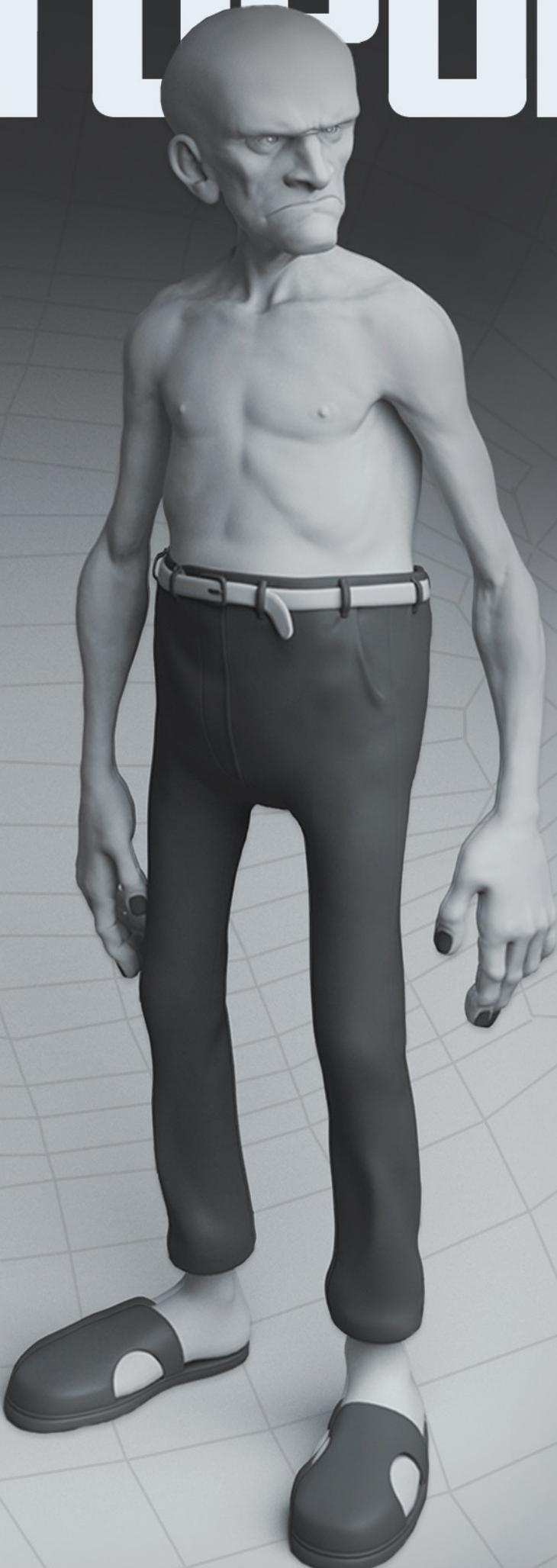
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TOPOLOGY



With all topics and skills there are core subjects that must be considered and understood in order to get the best results. When working in 3D, one of those is topology. In this series of tutorials Diego Maia will be talking us through the creation of his interesting character, whilst explaining the intricacies and importance of this fundamental subject.

THIS ISSUE

Chapter 01 | An introduction to Topology

NEXT ISSUE

Chapter 02 | Limbs and Accessories

FEBRUARY ISSUE 078

Chapter 03 | Cleaning up and Adjustments

MARCH ISSUE 079

Chapter 04 | Hard Surfaces

CHAPTER 1 - AN INTRODUCTION TO TOPOLOGY

Software used: 3ds Max

INTRODUCTION

Over four chapters we'll be talking about topology. This is a subject that causes problems to many people and in most cases the problem is purely in simple details that can be easily avoided if we plan our modeling and try to get clean topology.

There are a large number of issues that are recurrent concerning topology, especially when the models are made for animation. This will be our focus: making good topology for animation. Once you can do this you should be able to cope with anything, even high poly models for still images (**Fig.01 – 02**). We will also look at how to achieve functional topology. We will talk about the theory of edge loops. The tools we use to do this will not be focused on, as what is important is the principles. Once you understand these they can be applied in any package.

To begin it is important to say that when it comes to modeling there is no single correct way to work. Every modeler should understand the way that works best for him or her and choose their own pipeline and method. In this series I'll be working with a pipeline that works for me in most cases, especially for characters. Nevertheless there is a short list of things that are important to keep in mind. So let's get started.

I'll be demonstrating these points using a character from a personal project (**Fig.03**). His name is Miranda. We won't focus on the modeling process so we will move straight onto topology.

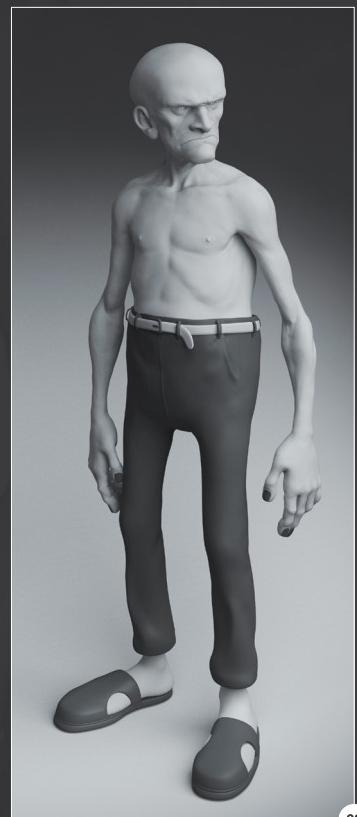
Most tutorials start by teaching the box-modeling technique and it's really important to know how to use and understand these tools,



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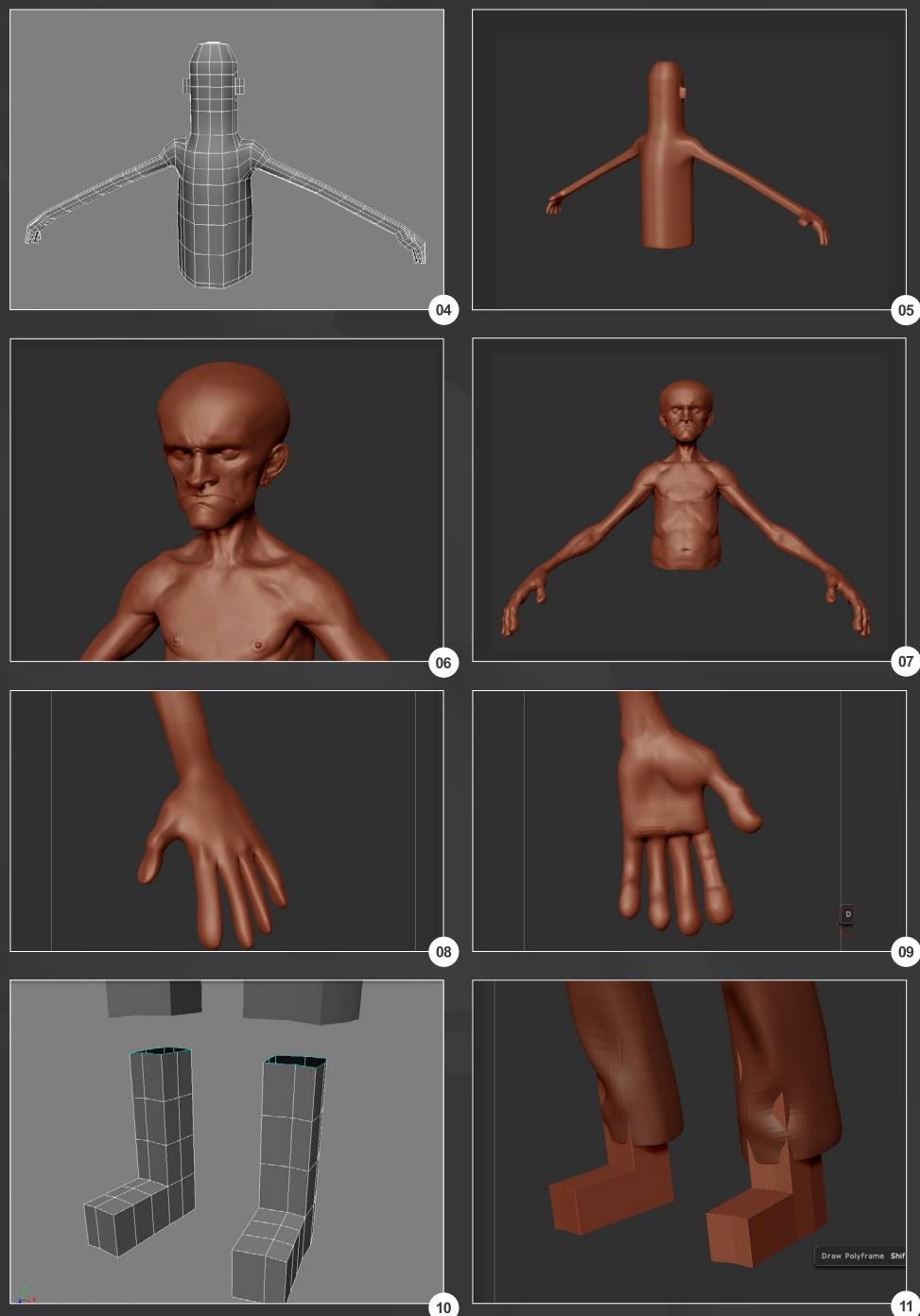
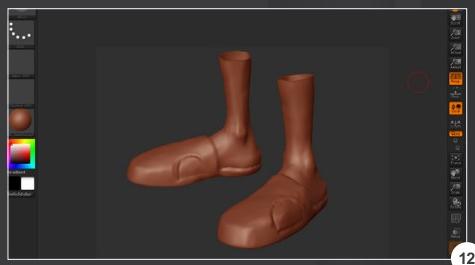
but today we have the retopology process. This allows us to separate the art/sculpture process from the technical one. We can focus on the shapes, gesture and design without coming across technical issues all the time (a spiral loop or triangles for example). This means that you can create the model in an artistic way and then clean the topology afterwards.

To do this you would use tools like the Snap tool, which allow us to work freely by changing the direction of loops, and deleting and creating polygons. It's faster to do things this way and means that the result is 100% clean and functional topology. However, this does highlight one of the problems with box modeling. It means there are many loops and polygons that will appear useless.

These days the process no longer needs to be linear. We can come and go easily from one program to another to make adjustments using the Projection tool or the GoZ plugin. In addition, all major 3D programs import .obj extensions. For this tutorial I will use XSI for polygonal modeling, ZBrush for sculpting and Silo for the retopology.

I will be looking at a character that has organic and inorganic forms. We will start the tutorial with a rough base without worrying about the loops as we just need something to work with in ZBrush. Fortunately for us artists new tools are appearing all the time that help us avoid the base mesh process, such as ZSpheres.

So to start with you need a rough base mesh, which in my case was made in XSI. Note that I don't even have loops for the eyes and mouth, etc (Fig.04).



After you have created the base mesh, export the .obj file into ZBrush (Fig.05). The next step is to start the blocking process, which in my opinion is the fun part. As it's not the point of this tutorial I won't talk about the sculpting of my image; you will have to create your own character and then we will look at the topology of it. To make my model I primarily used three tools: the Standard, Clay and Move brushes.

Fig.06 – 07 show a few of the stages of my modeling process. Work with your character

until you have the shape and proportions you are happy with. Don't forget that things can still be adjusted after you have handled the topology, but we will come back to that later.

I worked with stylized characters proportions: a big head, heavy hands and thin arms (Fig.08 – 9). You can see the legs before and after the sculpting process in Fig.10 – 12.

As I mentioned, the point of this process is not to talk about the sculpting process, so let's start

working on our topology. I use Silo because I really like the way the Snap tool works, but the principles can be followed in other software packages as well.

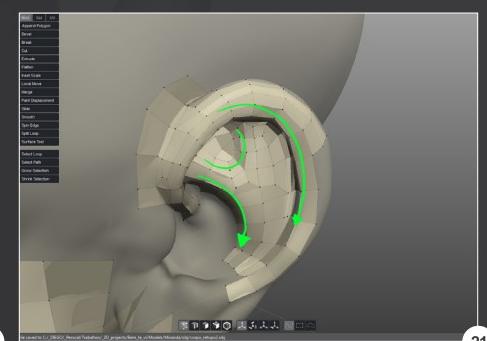
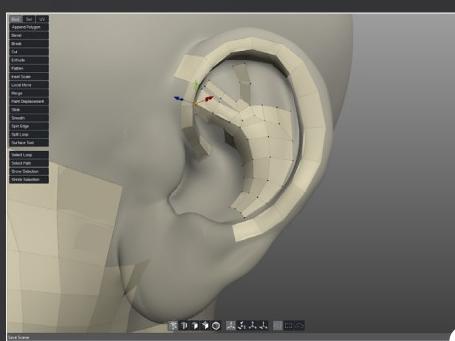
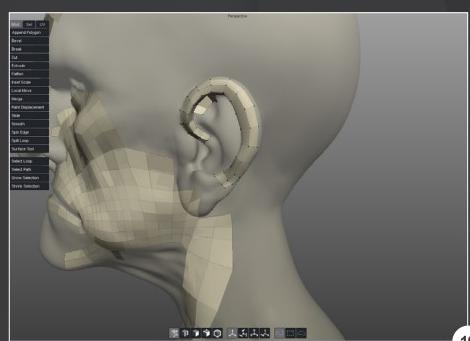
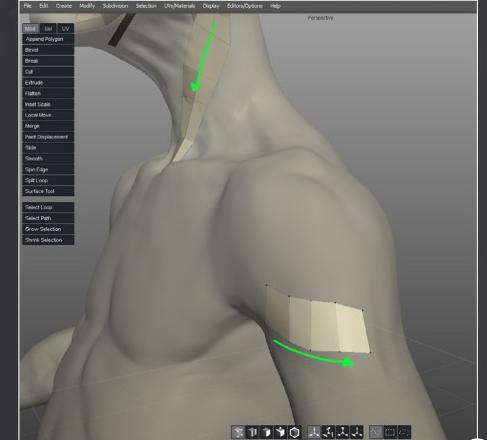
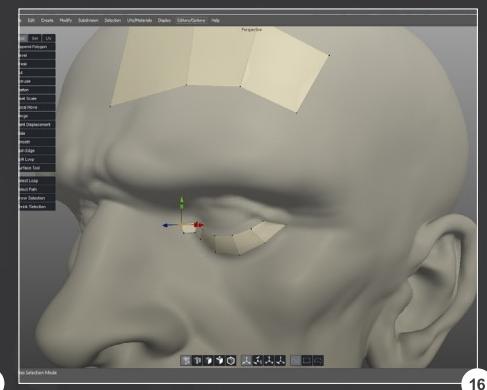
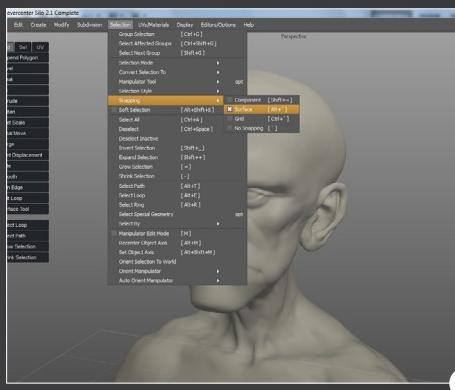
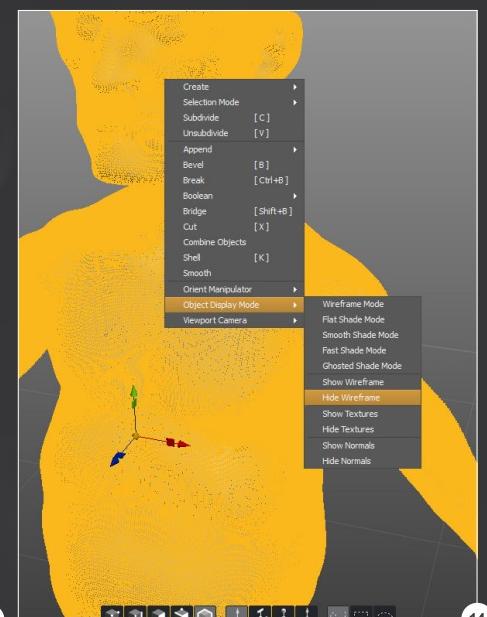
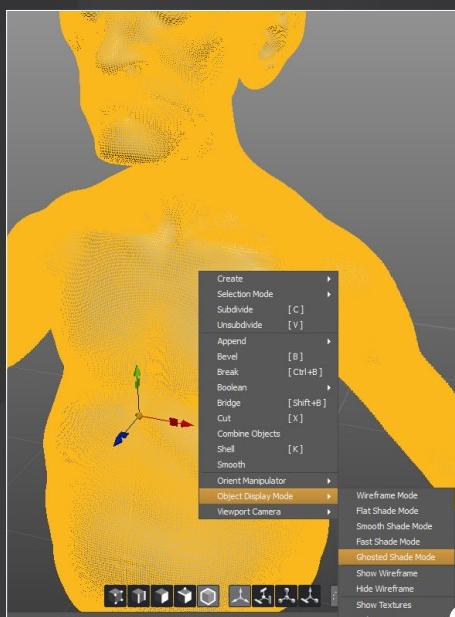
I usually start the process by making the high poly model slightly transparent as I think it helps with viewing the topology. If you are using Silo you can turn on Ghost Shaded mode and hide the wireframes (**Fig.13 – 14**).

Remember to turn on the Snap tool before starting to retopologize. You can find this tool in all the main software like Maya, 3ds Max, XSI and modo etc. Even ZBrush has great tools to do this (**Fig.15**).

It is very important to make the loops follow the flow of the volumes/shapes and avoid triangles and shapes with any other amount of sides than four. You will come across problems if you use shapes with more sides than four when using blend shapes, rigging or even when rendering. Some software doesn't work correctly when rendering displacement maps and using geometry with triangles.

Start by creating a single polygon and extruding the edges from it. In the beginning the most important thing is to set the direction of the loops (**Fig.16 – 17**). I usually work in separate areas and then try to connect them. You can see this at work in **Fig.18 – 21**.

Make the loops follow the general flow of the muscle. Knowledge of anatomy helps at this point. If you don't feel confident doing this, find a reference that will help you to make sure it flows



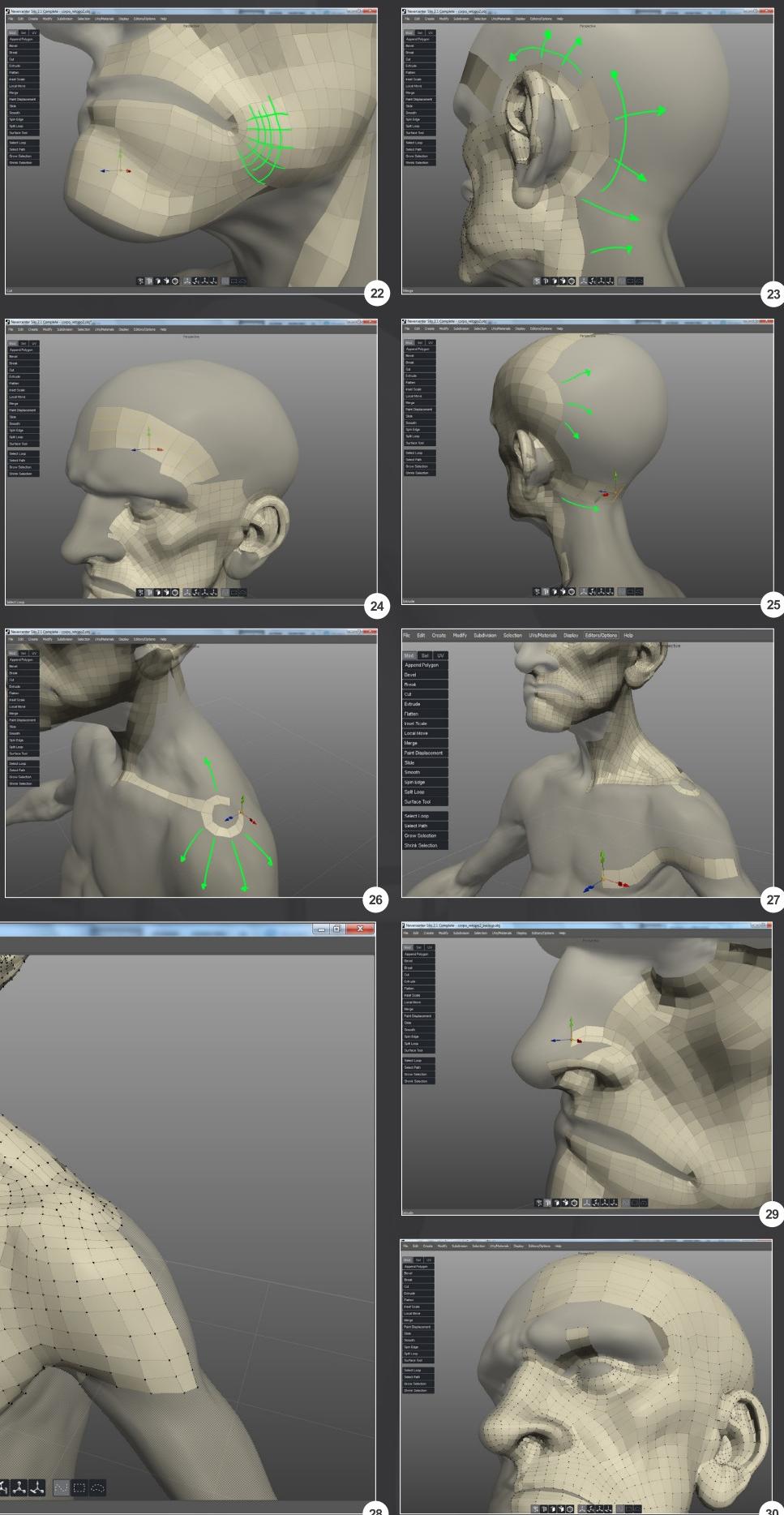
correctly. You will also find that the pieces join together better if you follow this rule.

In **Fig.22** you will see a higher density of edge loops at the corner of the mouth. This is quite important because if you were making it for an animation you would need these to make the face smile, speak or kiss. You can see how the polygons flow around the face and around the neck (**Fig.23 – 25**).

In **Fig.26** you can see how the direction of the loop follows the collarbone. At the tip of the collarbone we will need to create a circular shape that allows for the rise in the shape of the shoulder.

Make the shoulder loop flow down the chest. This will allow the geometry to behave in a similar way to muscles after rigging (**Fig.27 – 28**). If you do this correctly you can get good results using simple blend shapes matching the bone's rotation.

Continue to follow the flow of the muscles and forms for the nose and eyebrows, as I have done in **Fig.29 – 30**. You will be doing this all over your model, matching the flow in the



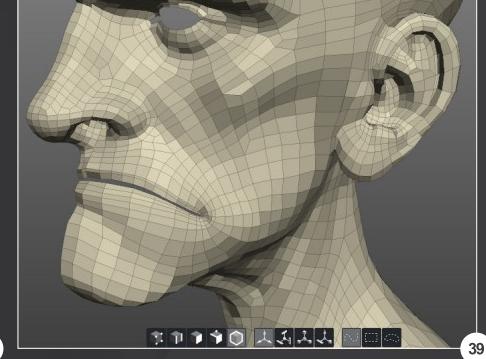
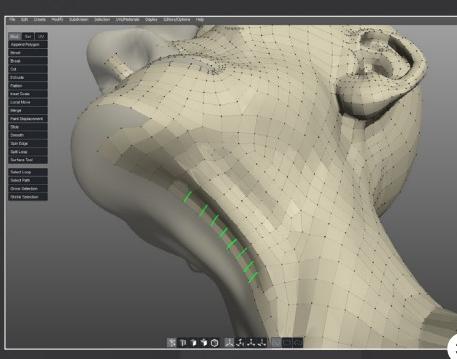
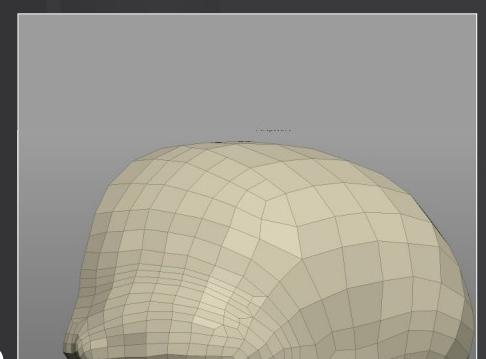
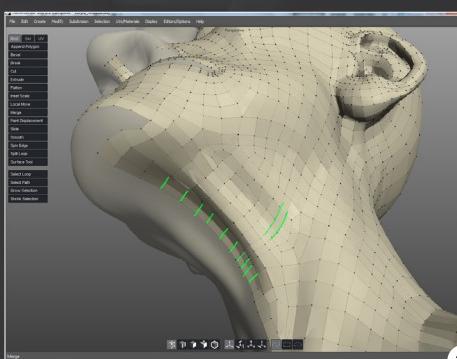
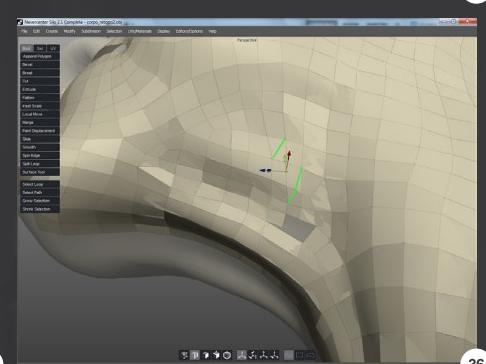
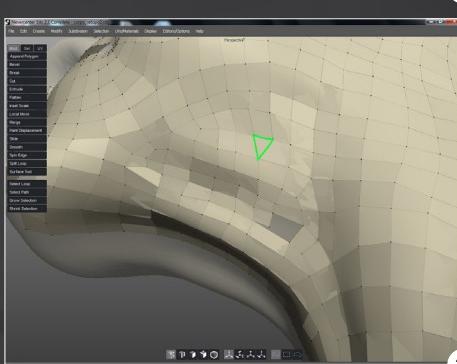
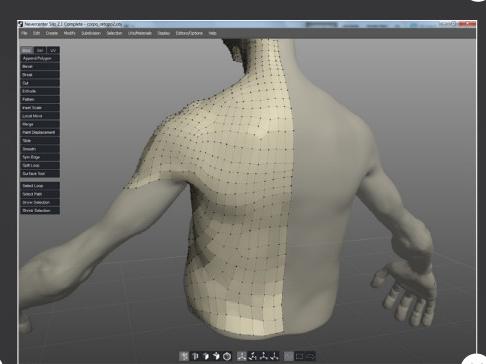
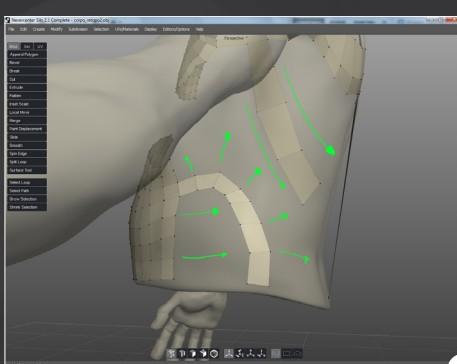
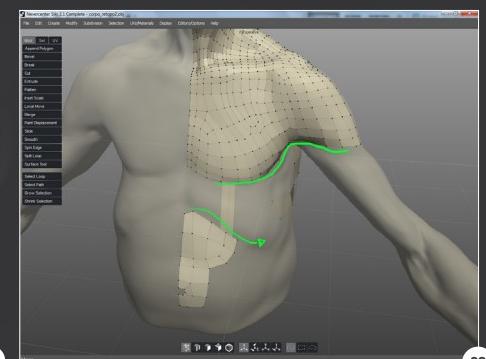
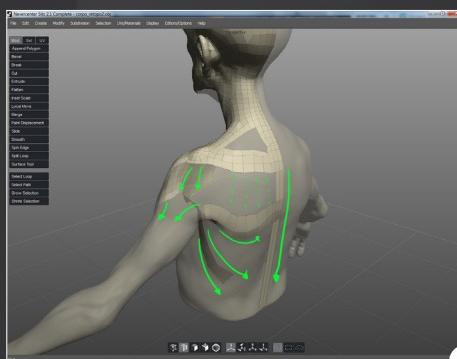
separate areas and then joining them together when the different areas meet (**Fig.31 – 34**).

In **Fig.35 – 36** you can see how to fix problem areas in the topology. In Fig.35 you can see the unwanted triangle and the adjustments made. Each problem area you come across will require a tailored solution. When you browse for shapes that haven't got four sides in your geometry you will come across a few areas where there are problems. Usually this can be solved quite simply by connecting the problem shape with the polygon next to it. This would usually create a square. Another trick is to cut the geometry and make it a quad.

Try to keep the same distance between the loops as much as is possible. This will prevent many problems when creating the UVs and textures, and will avoid division problems when rigging and animating **Fig.37 - 38**.

Fig.39 is a snapshot of the final head topology. This topology provides enough loops to help the animator to achieve the creases that would be made when the face is expressing emotions. In a professional environment it would be necessary to speak to the rigging and animation team to make sure that you cater for every sort of animation that they would like to do.

When you have done this you can delete the high poly base and finalize any of the remaining details like the inside of the mouth and around the eyes. In the next chapter we will be looking at creating the rest of the body and the accessories.



DIEGO MAIA

For more from this artist visit:

<http://maia3d.blogspot.com/>

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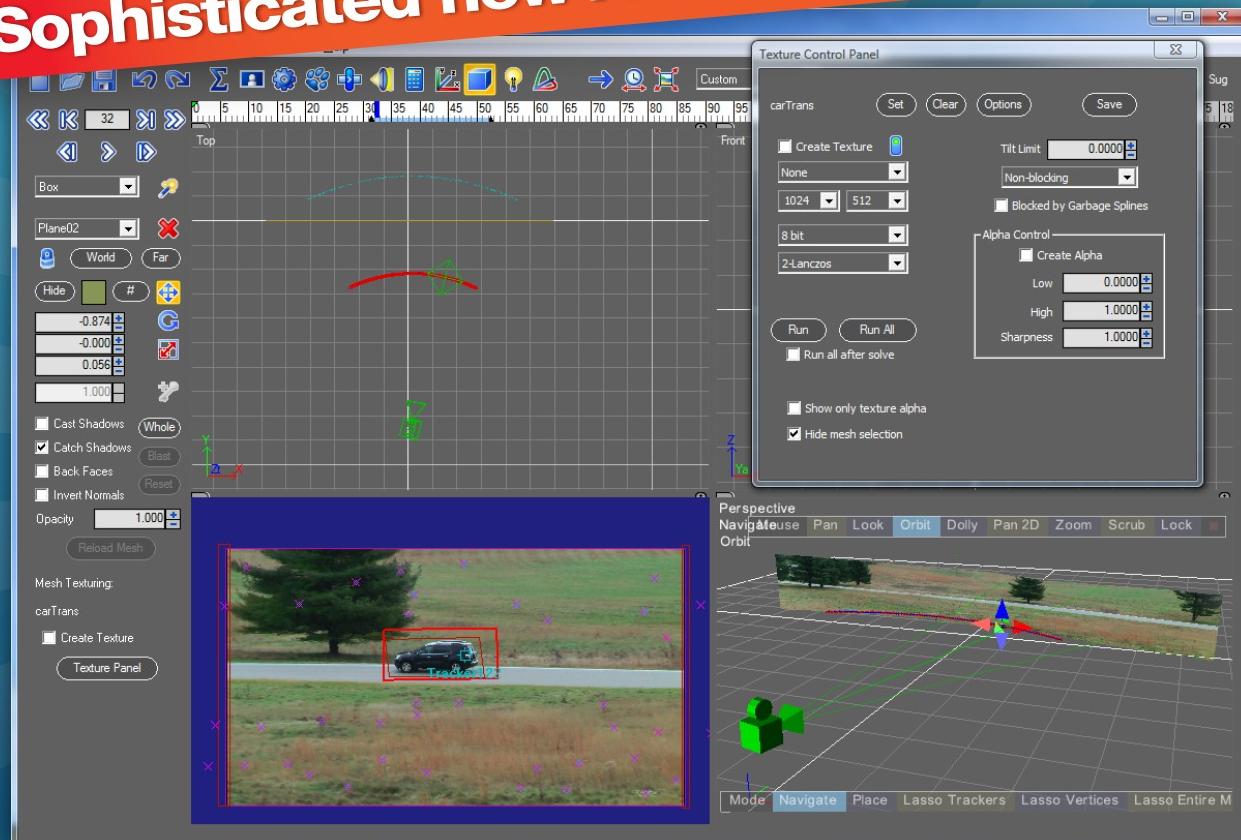
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"I WANTED TO CREATE AN AMBIGUOUS CHARACTER THAT WAS COLORFUL, FUN AND LIGHT-HEARTED"



MAKING OF BY RAPHAEL BOYON

JESTER

In this month's Making Of Raphael Boyon will be talking us through how he created his stunning image of a Jester, concentrating particularly on the stunning textures.

JESTER

Software used: ZBrush and Photoshop

Jester is a personal project that I started five months ago. I wanted to create an ambiguous character that was colorful, fun and light-hearted. However I also wanted the image to have slightly creepy overtones. The overall aim was to make the viewer feel slightly uncomfortable, without it being too obvious. Among my numerous references, the Joker from the *Batman* series and the film *Clockwork Orange* were the ones that stood out the most.

SCULPTING

The modeling stage was mainly done in ZBrush 4. I started by working on the face as I knew that this is where most of the creepiness would come from. The creepiness was particularly portrayed in the jester's eyes. After the face was modeled I made it asymmetrical and decided that I wanted the jester to be looking up at the camera, which would be in an elevated position.

I then moved onto the body, which I made quickly from an old base mesh to establish the proportions. I didn't spend too much time on this, but I still wanted an accurate mannequin that I could add clothes to without too much trouble. It was also important to make sure that the pose meant that there would be plenty of places where the jester's clothing could hang. I wanted him to look as if he was bowing forward a bit, as if he was an old man. The general rule of thumb that I use when modeling is that if something is made of separate pieces in real life they should be separate subtools in ZBrush. I applied this principle for this model as it made things more manageable and gave me more freedom.

When I got to the detailing stage I had to divide my scene into multiple sub-scenes as the polycount quickly raised up to over 100 million. All the fabric patterns were either stamped from custom created alphas, or created through



01

inflating a mask (Import texture > Mask from intensity > Deformation > Inflate). The Roll options were also used to create some of the custom trim patterns on the shirt and pants (**Fig.01**).

EASY TEXTURING WITH SPOTLIGHT AND POLYPAIN

I wanted to experiment with Spotlight to texture the face and hands. There are a lot of tutorials about this powerful tool so I will not go into details in this article; however, I will point out

that as I had sculpted the pores I removed them from the photo references I used for texturing. I knew that I would reintegrate them to the diffuse texture later through a Cavity map.

When the spotlight texturing was laid out I took care of the rest using Polypaint. I wanted this character to feel like an illustration so I exaggerated the skin tones and tried to remove all of the photographic detail. **Fig.02** shows a flat render of the horns. Cavity masking was very useful for parts of it, but parts of it were still hand-painted. **Fig.03 – 04** illustrates the result



02



03



04



of combining Spotlight and Polypaint on the face. **Fig.05** illustrates the same technique on the hands. Note the slight stains on the skin to emphasize the age of the character.

PHOTOSHOP TEXTURING

To texture the character I used techniques that varied depending on the type of task. To finalize the face texturing I baked Cavity, Displacement and Normal maps. This helped me a lot along the way as it gave me quick masks. In **Fig.06** you can see the Specular, Rough Diffuse, Epidermal and Normal maps. I wanted to have

sweat on the face and in some of the wrinkles, hence the light gray color on the Specular map. The Rough Diffuse and Epidermal maps were going to be used in the shading stage. The Subdermal and Backsurface maps were also created, but their effect is much more subtle.

Fig.07 demonstrates my masking technique. I baked a Displacement and Normal map for most of the clothing. I also created black and white masks in ZBrush through cavity masking and hand-painting. They would be useful in the next step to isolate and blend materials together.

Fig.08 demonstrates the technique used for the pants, which is more traditional. I polypainted them and baked a Diffuse, Normal, Cavity and Displacement map. Some parts of the clothing use a tiling velvet Diffuse map as a base so I created three shades of these (**Fig.09**).

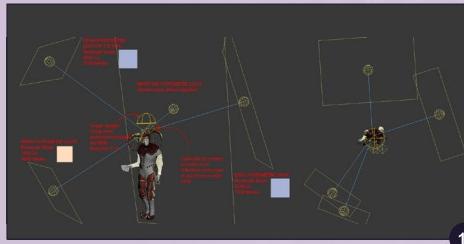
SHADERS SETUP

To emphasize the fabric patterns and make them shine I went for a gold-looking material. I used a blend material with a velvet shader

in one slot and a gold material in the other one. The black and white masks proved to be incredibly useful here as they gave me full control over where the velvet and the gold should go. I was also able to fine-tune each of them separately. The cloth used Roughness and a Fresnel falloff in the diffuse. For the skin I used Master Zap skin + shader. The settings are demonstrated in **Fig.10**. Blending through a shellac material is another option to help you get nice specular spots and reflections. Another interesting shader is the one used for the collar that I wanted semi-transparent. I got this result by using a simple tiling alpha.

LIGHTING

This step was pretty straightforward. To enhance the ambiguity of the character and create contrast I wanted one side of the face to be lit by a warm light, as if there was a fire on one side. I then wanted to contrast that with a cooler color from the other side. The lighting setup can be seen in **Fig.11**. An HDR was also used to make the lighting a bit more uneven and create more reflections on the gold patterns.



Compositing was done through several passes in Photoshop. I used a base render to which I added a Rim light, Zdepth, Alpha mask, shadows and Ambient Occlusion.

I hope this Making Of was useful to illustrate the various techniques used to create this piece. Thanks for reading!

RAPHAEL BOYON

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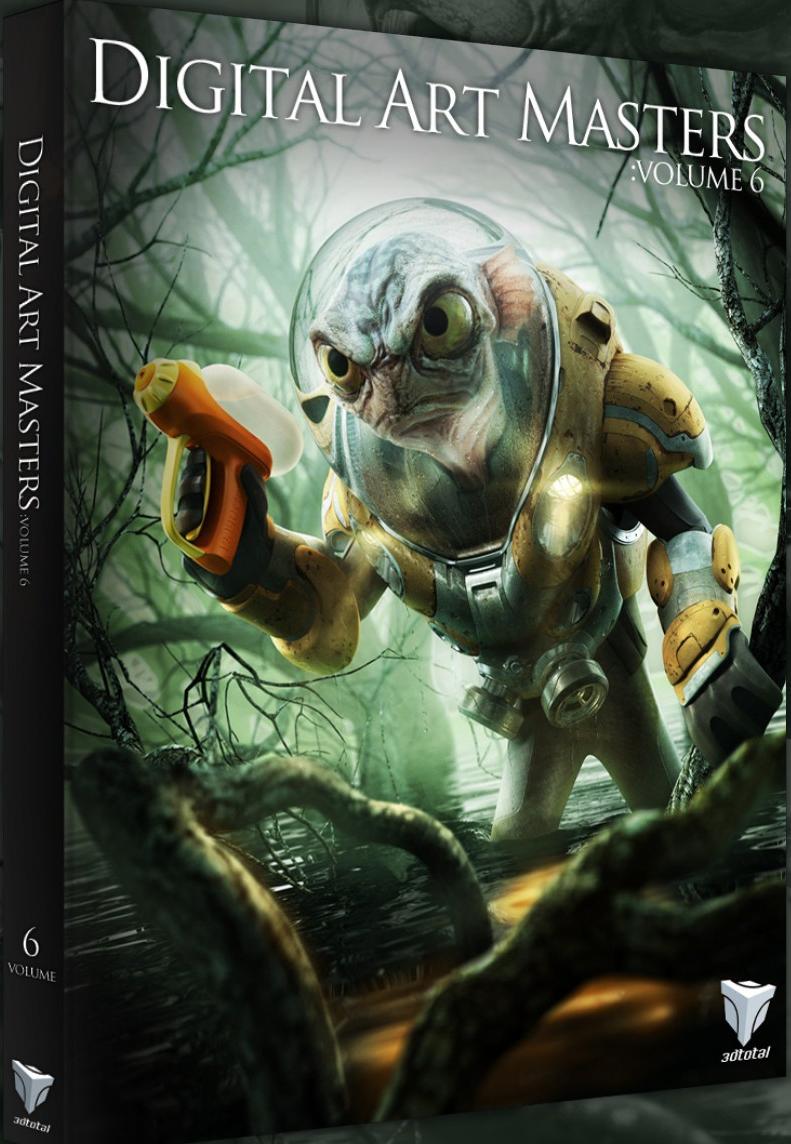
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This month we feature:

"FISH MAN"

BY FABRICIO MORAES

The following shots of the “Fish Man” book pages are featured here in full-resolution and can be read by zooming in...



FISH MAN

BY FABRICIO MORAES

JOB TITLE: Character Artist

SOFTWARE USED: 3ds Max, mental ray, Photoshop and ZBrush

INTRODUCTION

I always loved Blizzard's Starcraft manners, which was the main inspiration behind this work. I also like realistic cartoon styles and so I thought about how I could mix these two genres and inject some humor.

I sketched this fish-like humanoid, which required a special suit to leave the water (Fig.01). The water pistol added the comic element, which I wanted to keep clean and colorful to contrast with the rest of the scene and make it more noticeable.

I started this work in 2008, but due to a lack of ideas and time I stopped until the beginning of last year. Of course, after two years I had different ideas and the concept underwent some changes. My work colleagues gave me a lot of ideas that helped to improve the work. I think it is essential to hear the opinions of others as they always have a different vision that can add something new.

MODELING

No special techniques were used to make this work. I used ZBrush to model and texture the head and 3ds Max to model the rest of the body. ZSpheres are a quick way of making base meshes, so I used them to get an overall idea of the head. With the form done I sketched some details such as the gills (Fig.02).

The next step was the retopology so that I could work with a better mesh. I exported the high poly base mesh into Max and used the Graphite Modeling tools to reconstruct a new mesh over the old one. After creating the UV mapping for this new mesh, it was exported back into ZBrush so I could work on the details and textures (Fig.03).

The armor was a little trickier because it needed to be a mixture of a realistic and



277

cartoon style. I took a lot of references from Blizzard's manners, but I didn't want Fish Man to look as powerful, which is why I left the arms uncovered and showing a thin silhouette.

THE SWAMP WASN'T DIFFICULT TO MODEL; MY REAL CONCERN WAS POSITIONING THE TREES SO THAT THEY COULD BE REFLECTED IN THE FRONT OF THE ARMOR

He remained cartoon-like, but at the same time I wanted him to look realistic in some way, so I was forced to consider how his armor would articulate. In other words it needed to look functional, so I imagined how it could be assembled if it really existed.

I first made a very simple base mesh for the body to get a better idea of its proportions, after which I modeled low poly versions of the main parts to see the overall design. After this I was able go into the details, making the joints and various components mentioned previously (Fig.04).

I imagined Fish Man coming out from a swamp during a humid, cloudy afternoon. The swamp wasn't difficult to model; my real concern was positioning the trees so that they could be reflected in the front of the armor.

and also permit light to pass through them. I had to place trees all around the character to compose the scene.

After having posed the character, I exported a plane into ZBrush to create the ripples for the water, which were exported as a Displacement map to use with the Displace modifier (Fig.05). Before applying the modifier I subdivided a small part of the mesh close to Fish Man so

I could optimize the poly count and generate more detail only where I really needed it (Fig.06 - 07).

TEXTURES AND SHADING
I employed ZBrush's ZAppLink plugin to texture the head and project photo selections onto the mesh using Photoshop. This came in handy since I am very familiar with Photoshop and using this procedure is similar to manipulating

CARTOON

photos over a 3D mesh. One good photo of a fish was enough to make the texture of the head (Fig.08).

My idea behind the armor was that it shouldn't look too old. The intent was to create an appearance that was not too rusty or damaged. Some photos of rusted metals, scratches and painted metals were enough to make all the armor textures.

All of the armor utilized mental ray Arch & Design materials, with glossy reflections. A map was applied to each material to vary the intensity of the reflection. Making a reflective or even a very glossy reflection is an object to fit in an environment, which is why I had to include all the trees beside some being off camera. Reflecting the environmental elements and light with these trees helped cement the character in the scene. Here is an example of the torso material with the rest of the armor following in a similar way (Fig.09). Of course all these reflections came at a high price in terms of render time.

LIGHTING
As I mentioned before, the atmosphere is very humid and cloudy. To achieve this I couldn't use Direct lights and crisp shadows; everything needed to look smooth with soft shadows. The main light is a huge Sky Portal that covers the whole scene to simulate the cloudy sky. The other lights illuminate specific areas on the character that were too dark and add some specular highlights to help the armor look wet.

The culmination of lights still failed to make the scene look close to being finished. I was always aware that Photoshop could be used to improve the overall look very quickly. The most important part of this stage was retaining the information of each render such as reflection, specularity and volume.

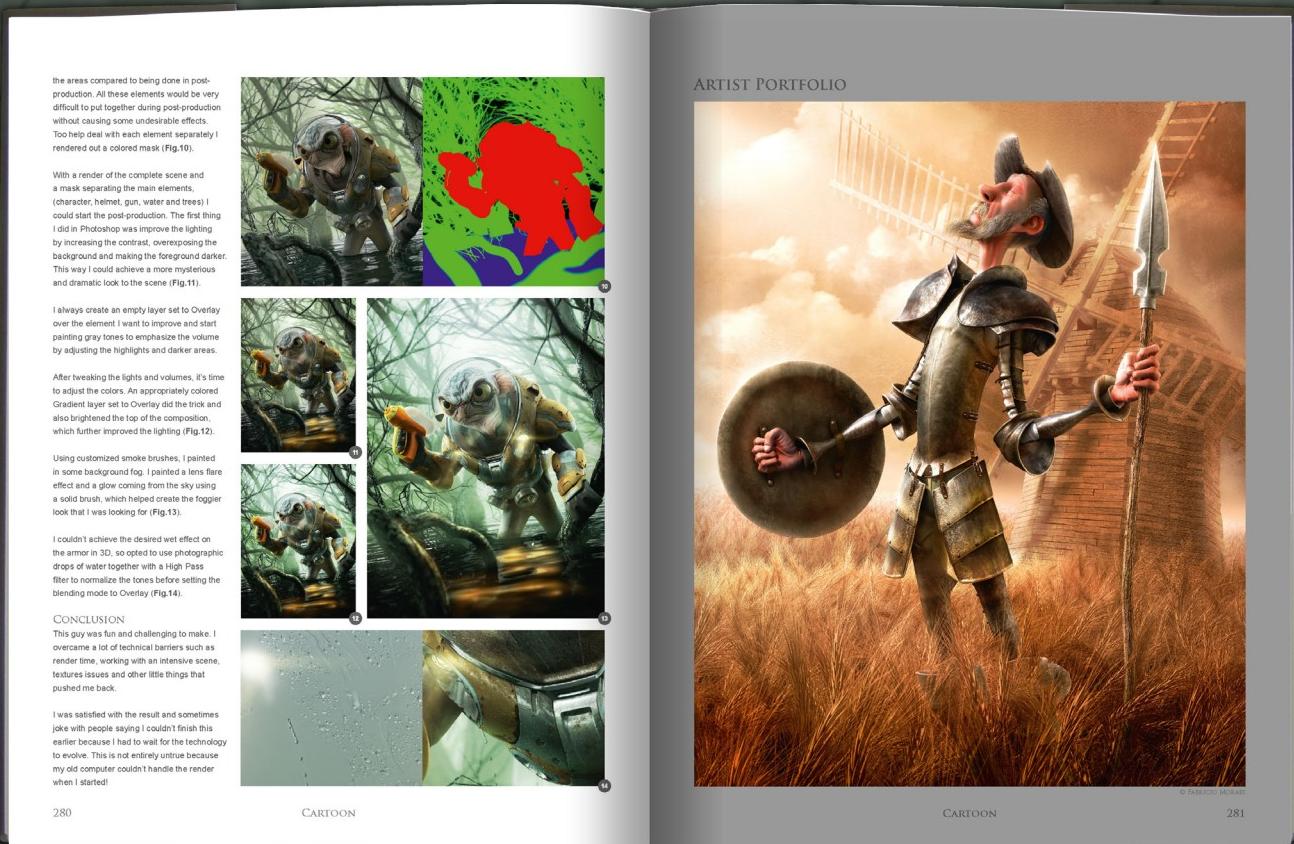
RENDER AND POST-PRODUCTION
The render was the toughest part. Everything was rendered at the same time, including the depth of field. I incorporated this because there was extensive interaction between the various elements, such as the trees reflecting in the armor and the water. The Depth of Field pass enables a smoother transition between

CARTOON

279

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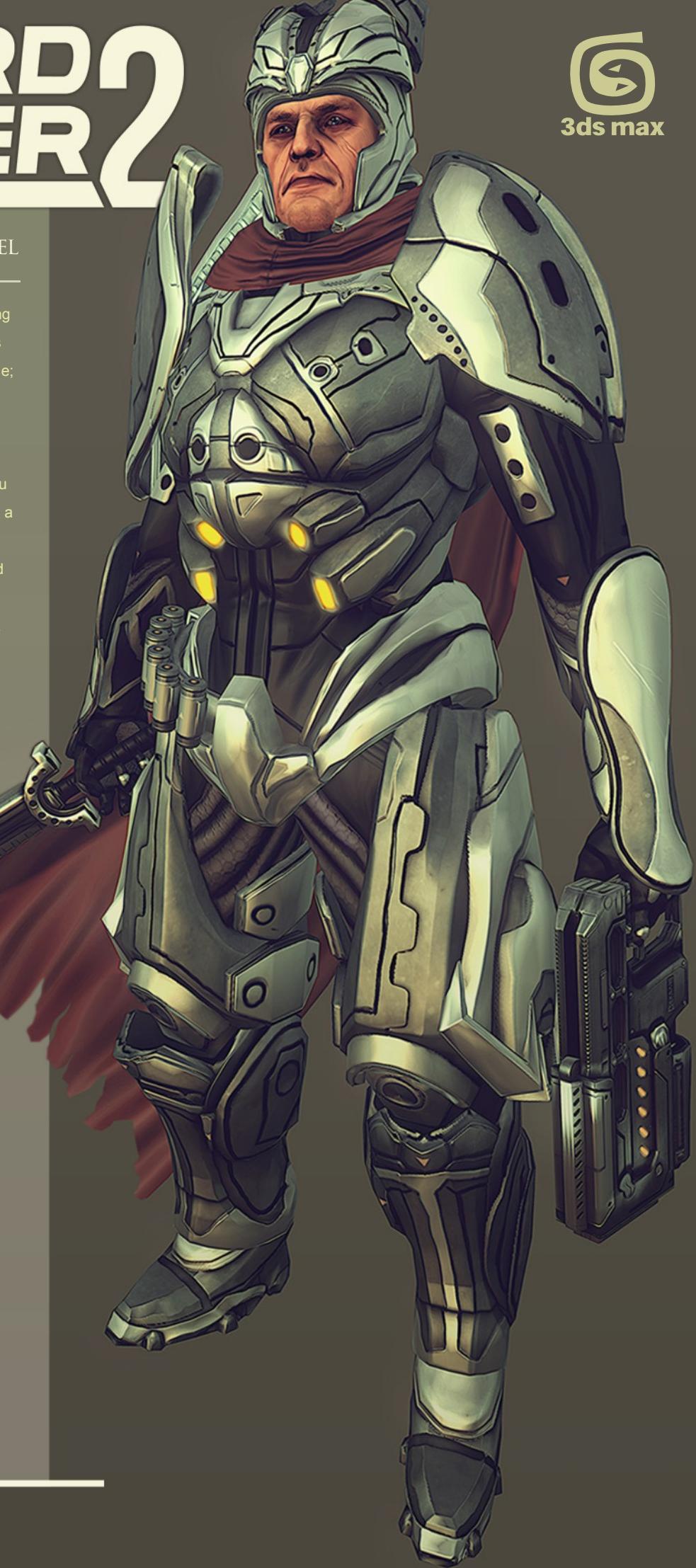


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CHAPTER 3 - LOW POLY MODEL

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CHAPTER 1 | OCTOBER ISSUE 074
Base model

CHAPTER 2 | NOVEMBER ISSUE 075
Sculpting

CHAPTER 3 | THIS ISSUE
Low Poly Model

CHAPTER 4 | NEXT ISSUE
Unwrapping

CHAPTER 5 | FEBRUARY ISSUE 078
Texturing

CHAPTER 6 | MARCH ISSUE 079
Rendering

CHAPTER 3 - LOW POLY MODEL

Software used: 3ds Max

INTRODUCTION

In this chapter we will be creating the actual in-game mesh (also known as a render mesh) that will eventually be posed and presented as if it were a true character asset for a current generation video game.

I like to begin my low poly models by bringing in the ZBrush model at its lowest subdivision level. This gives you a pretty solid guide to start from and means you can more or less trace the model when creating the final game mesh. This is a similar philosophy to the one exercised in previous steps when we created a cleaner base mesh from our sketch sculpt.

Before modeling analyze what the low poly model will actually consist of. Where you can duplicate objects, which parts are symmetrical, where will you need to put natural geometry seams for better unwrapping, how much you can accomplish with simplified shapes and fewer overlapping pieces etc.

It is also important to note that the three key points to low poly modeling are: having a model that falls under budget (this greatly depends on the nature of the model; in this case we are going to go a little higher than normal as this model would be considered a hero character and ultimately a portfolio piece), that easily deforms (focusing on proper topology so that the character can have enough geometry to bend/retain shape when animated and still be within budget) and that will have enough geometry to capture details from the high resolution model without too many artifacts (going too low can cause baking errors, going too high can break the budget). All of these things need to be accomplished while maintaining the rough silhouette achieved in our sculpt (**Fig.01**).

Fig 01



Fig 02

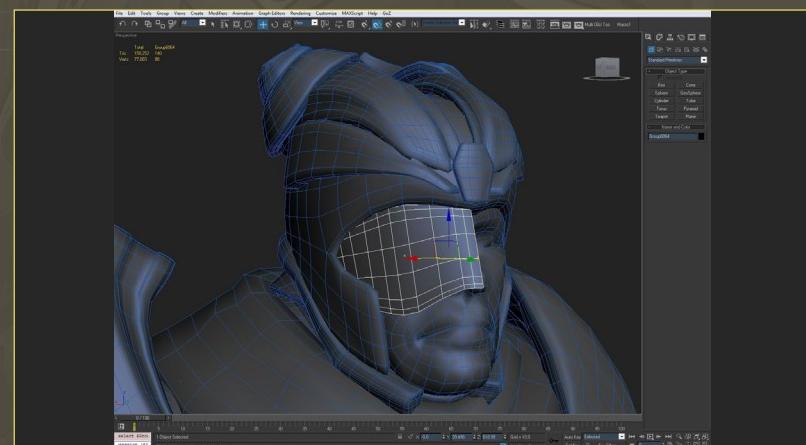


Fig 03

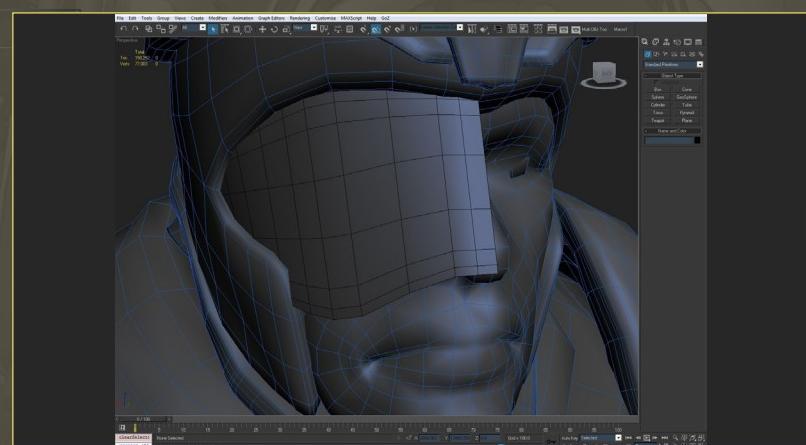
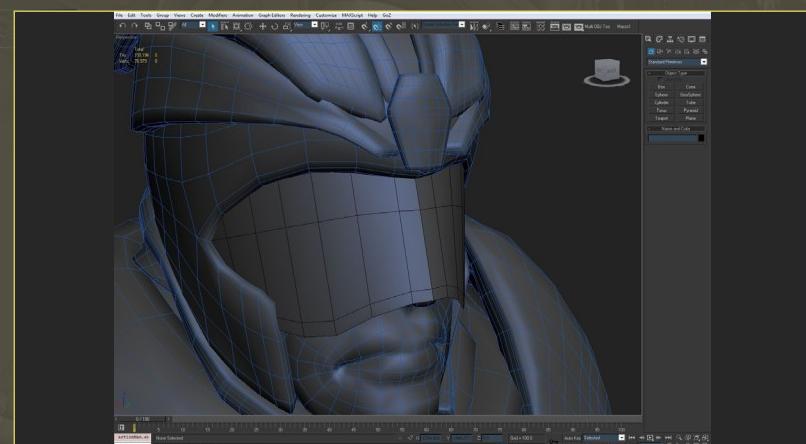


Fig 04



Not all of the pieces of this model will need to be created from scratch. Many different pieces can be created quickly by removing unneeded edges. An example of where this will work is the character's visor (Fig.02).

First split the entire thing down the middle by removing half of the faces on one side and removing all of the back faces that gave the sculpt depth. The key here is to retain the rough shape of the model without making a mesh that is too dense (Fig.03).

For the most part the visor is practically a straight plane running from the forehead to the nose. Therefore you don't need a lot of geometry to keep its original shape. However, since the visor wraps around the character's face and has a slight curve on the bottom, more vertical edges are needed to keep this shape nice and smooth (Fig.04).

Once all of the unnecessary edges have been removed, the model can be duplicated and mirrored on the X axis. The two halves are then combined into one solid mesh with the vertices welded down the middle. This is basically the same technique that will be carried out in all future steps. The character is mostly symmetrical in either the X or Y axis excluding a few details that are layered over the top of the original model, which will be handled separately (Fig.05).

Moving on to the helmet itself, take a face off of the original model and begin building out using the edge extrusion method shown earlier (Fig.06).

Create edges where the jaw protector will need to be modeled and line the inner edge of the brow line. From here extrude edges out to the overlapping fins, which will all be incorporated to one solid mesh (Fig.07).

Fig 05

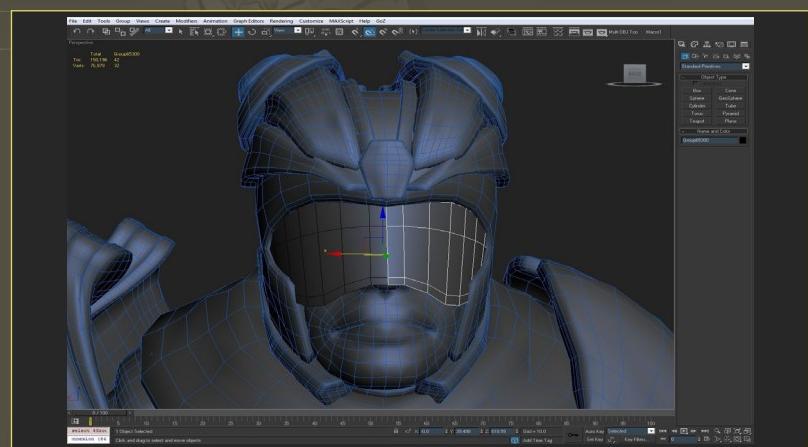


Fig 06

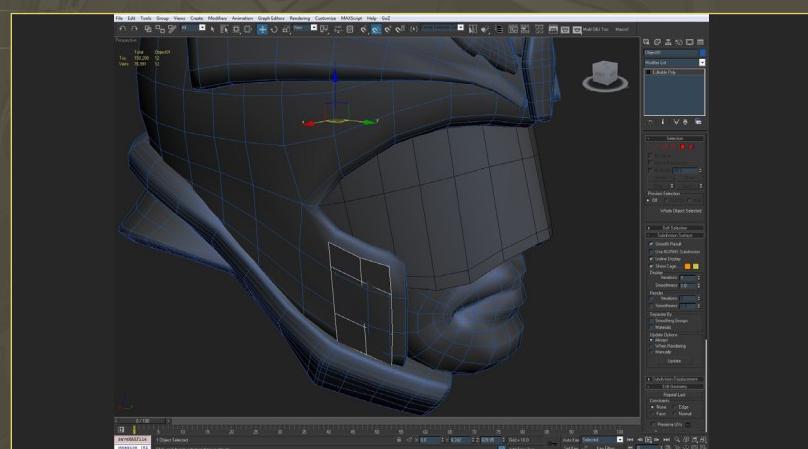


Fig 07

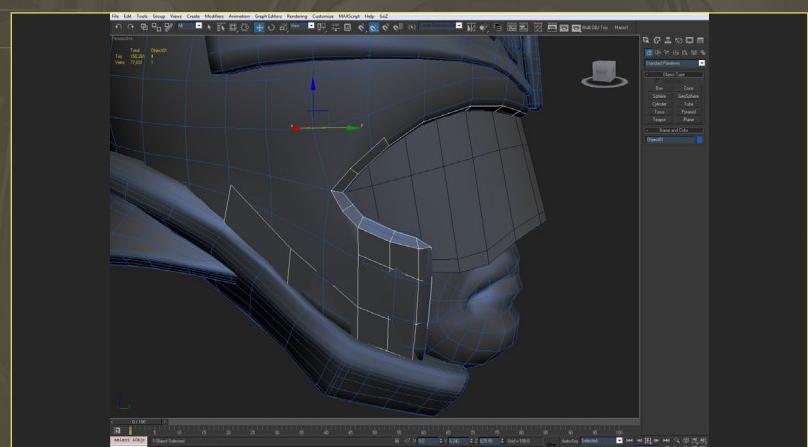
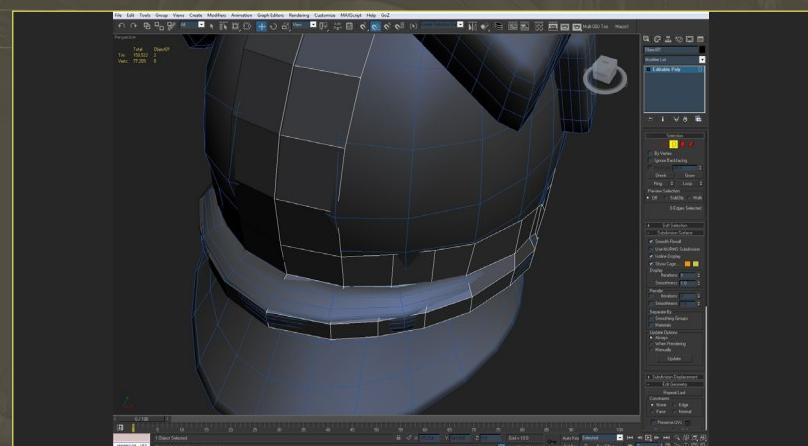


Fig 08



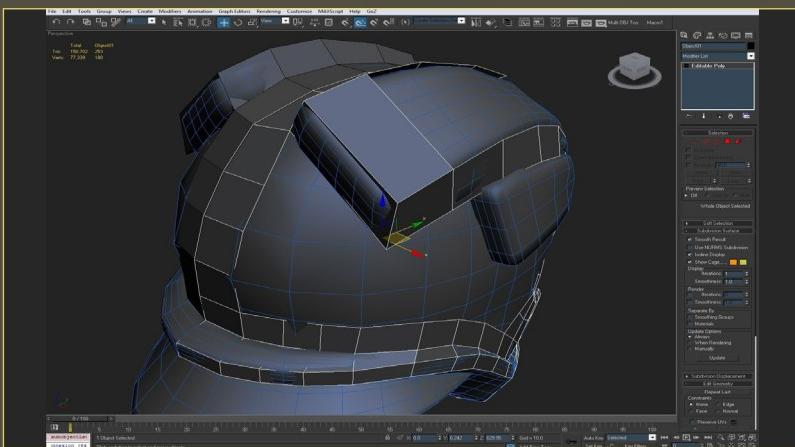


Fig 09

Wrap the edges around the back of the head again, using the base model as a guide for where to drop the edges. The key here is to roughly mimic the base shape we had on our sculpt with the game resolution faces lightly intersecting the original model (**Fig.08**).

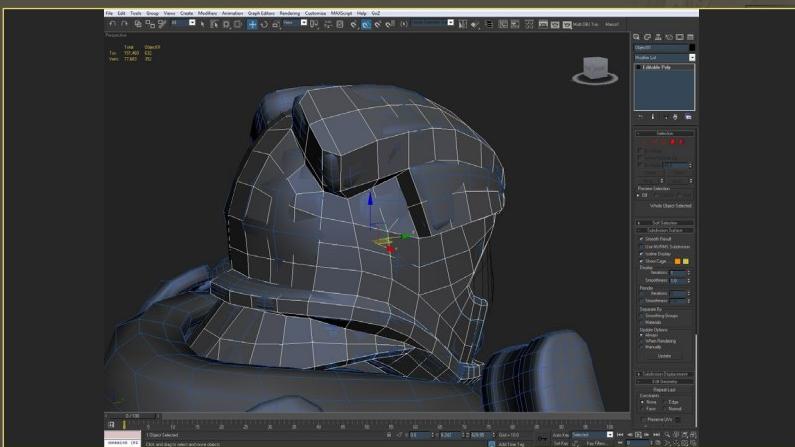


Fig 10

Extrude edges up around the cranium portion of the helmet to act as a sort of anchor point for all of the other details that will need to be incorporated. This helps avoid any un-smooth edges and headaches. Once these edges have been placed begin building out from there and model around the fins on the side of the head. You only need to be concerned with the bigger, lower frequency details here; the smaller details in our sculpt will just be in the Normal map (**Fig.09**).

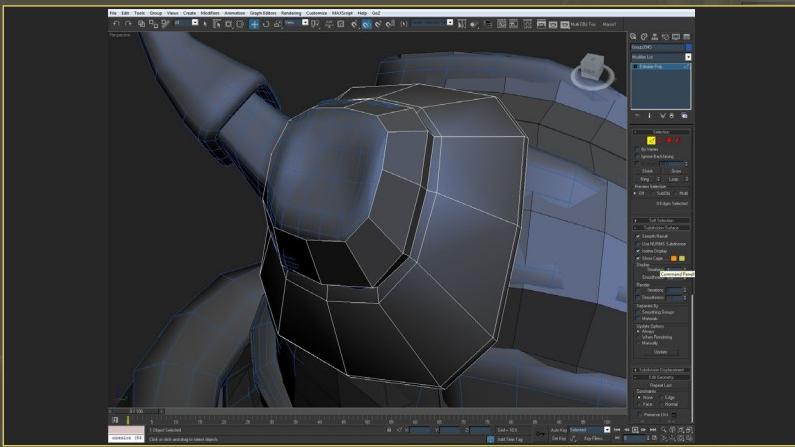


Fig 11

Building from the larger fin, move on to the lower portion and run those edges down to the front of the helmet. At this stage build out the jaw protector and neck fin, which are still all part of the one helmet mesh (**Fig.10**).

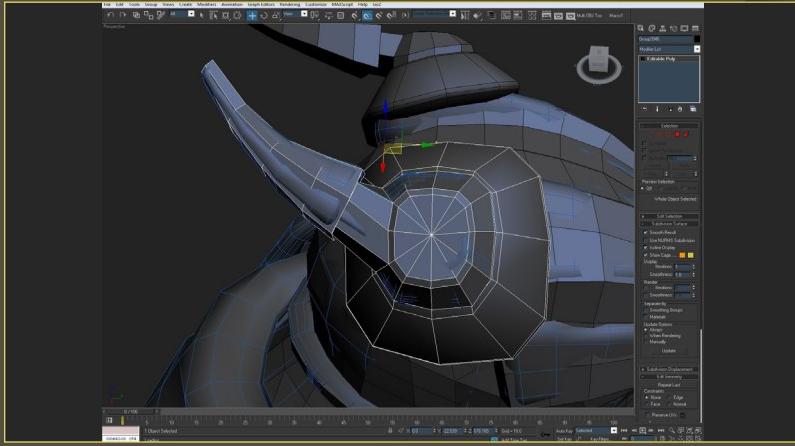


Fig 12

The only floating portion of the helmet other than the visor that can be removed or added for character variation is the antennas at the top of the head. For these, much like the visor, split off the base portion and remove most of the horizontal and vertical edges. Model the layered effect that was in the sculpt section by section until you cap it at the top of the model. This adds to the visual interest and makes it easier to add the actual antenna horns (**Fig.11**).

Grab a few faces from the back of the antenna base and extrude them outwards to match the general flow of the antennas. From there add the layering effect from the actual antenna to the chunk connecting it to the antenna base (**Fig.12**).

Move on to the face. Excluding the under armor sections, this is the only organic section of the model. Unlike the armor pieces there is more of a focus on proper topology here as the mesh would ideally need to be able to deform when animated. Generally hard surface objects like armor plates do not bend, so the focus for them is usually retaining a smooth shape rather than continuous edge loops.

To begin, grab a face off of the bridge of the nose and create a separate object. Instance that object on the X axis and begin adding some depth by building outwards using the edge extrusion method (**Fig.13**).

Move on to the line of the nose and work towards the edge of the lips, devoting a few edge loops that will eventually circle the entire mouth, much like the muscles that work underneath the skin (**Fig.14**).

Next extrude a ring around the character's lips, keeping the same rough shape as indicated in our sculpt. Try to devote enough geometry to the mouth, so that it can squash and stretch as needed when animating during expressions and lip syncing. Devote a few edges to the corner of the mouth. You should do this by adding one edge between the lips and one for the top and lower lip (**Fig.15**).

Extrude the edges inwards to complete the lips, adding one edge circling on the lips to give them some depth. From here build outwards using the borders we previously constructed to start forming the chin and nasal folds. Give the mouth two or three loops around the outside and terminate the third with a star just under the corner of the nose, as it is a relatively safe area to have five edges connect (**Fig.16**).

Fig 13

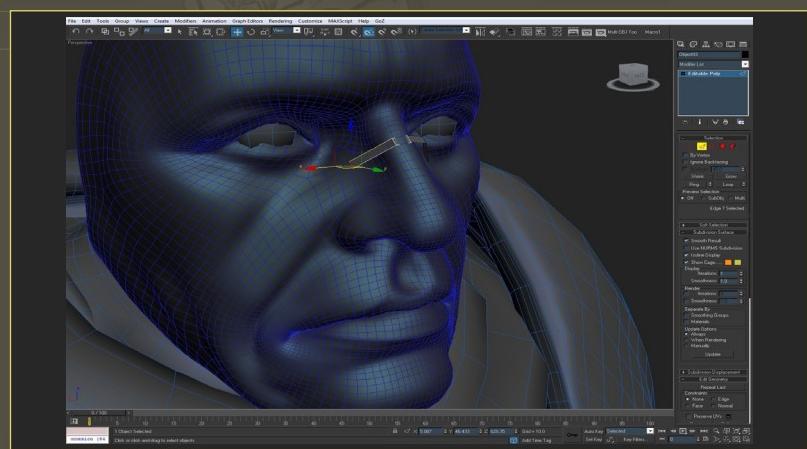


Fig 14

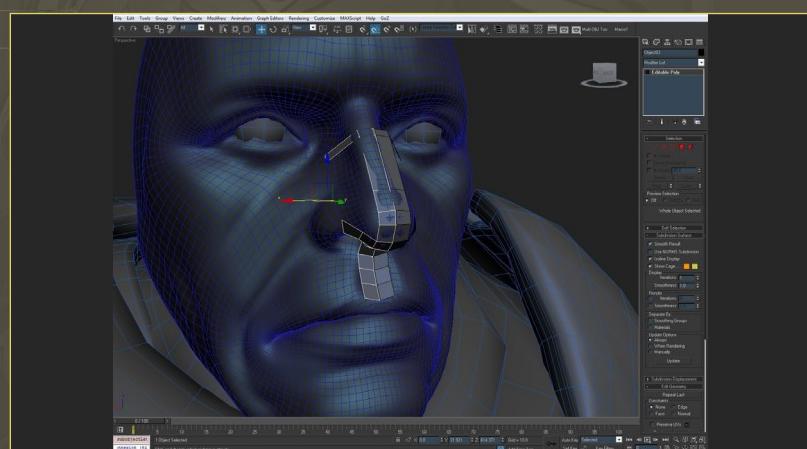


Fig 15

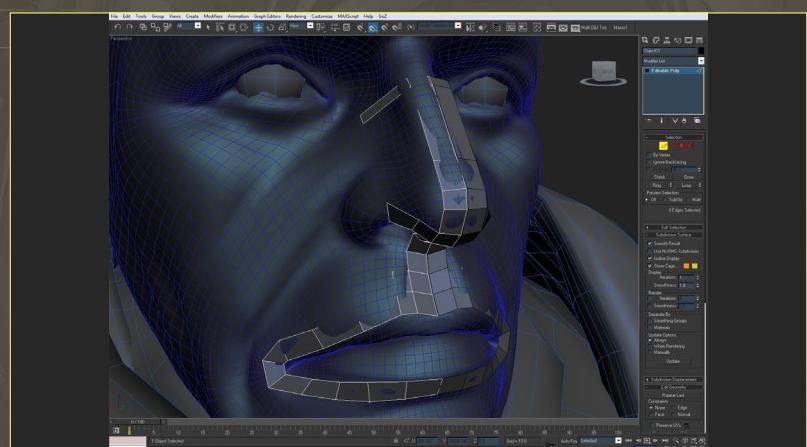
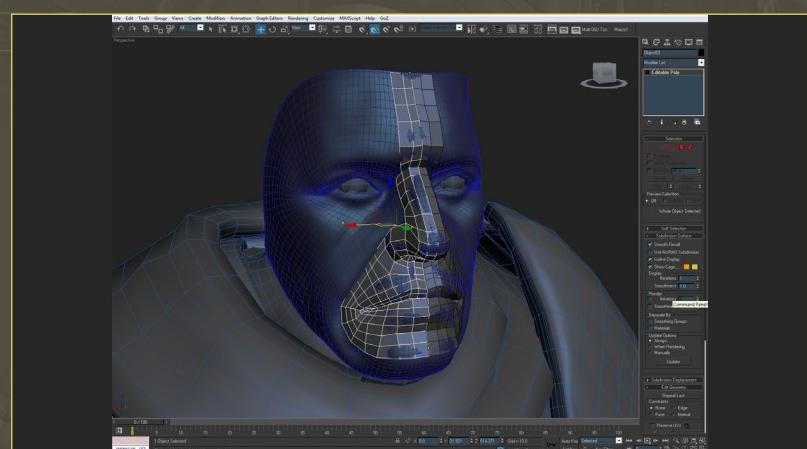


Fig 16



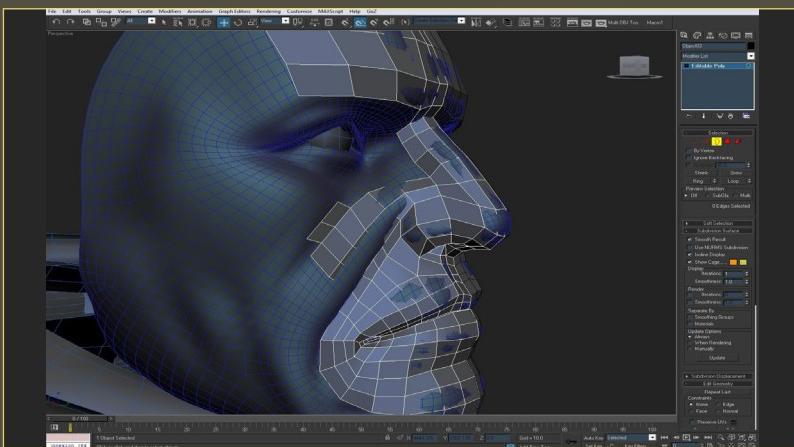


Fig 17

Next build out edges over the nostrils and continue them down the cheeks. I find this helps define smile lines and the fat a character like this would have in this section of his face. It is also an area that can stretch along with the mouth, so continue the edges right down to the chin and neck (Fig.17).

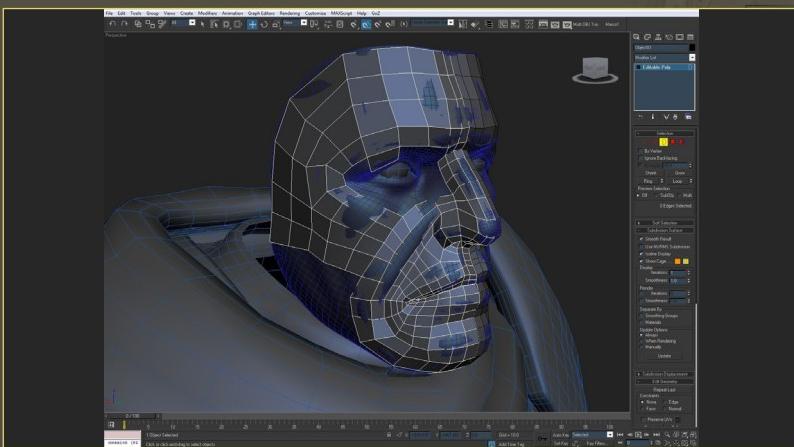


Fig 18

For the most part try to connect the eyebrow muscles to the top corners of the upper lip with a few edges. This will help retain the face's natural shape during extreme stretching poses and will also help that deformation seem more natural, as the flesh on a character's cheeks is generally affected when the mouth opens and closes (Fig.18).

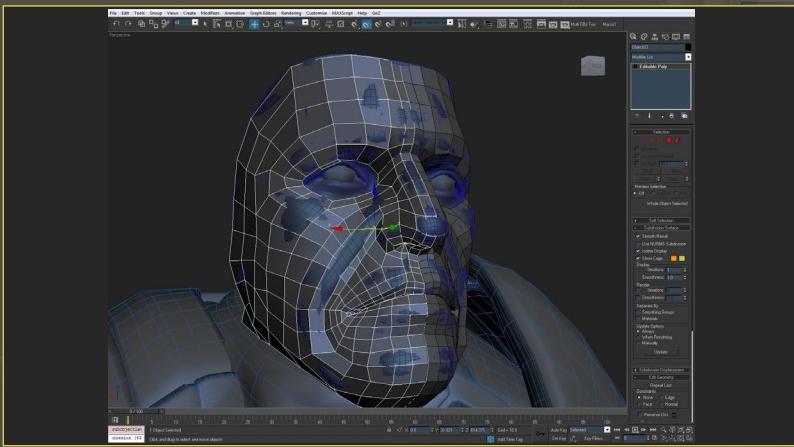


Fig 19

Next create the eye sockets and begin to outline the general shape of the eyeball and lids, as well as extrude the boundary edges outwards to complete the rough shape of the face (Fig.19).

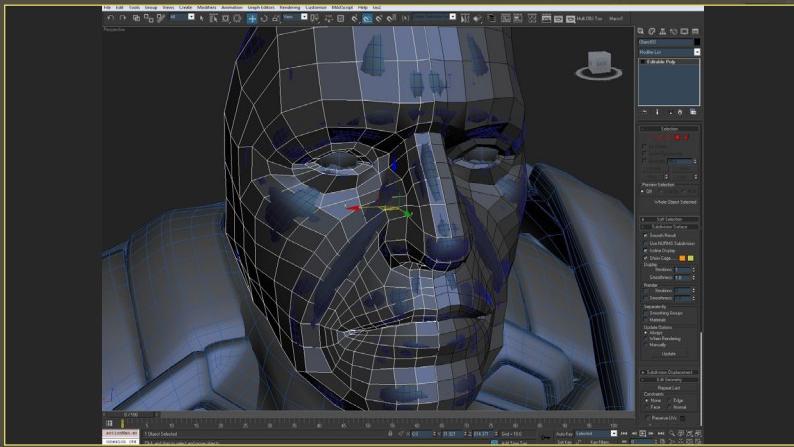
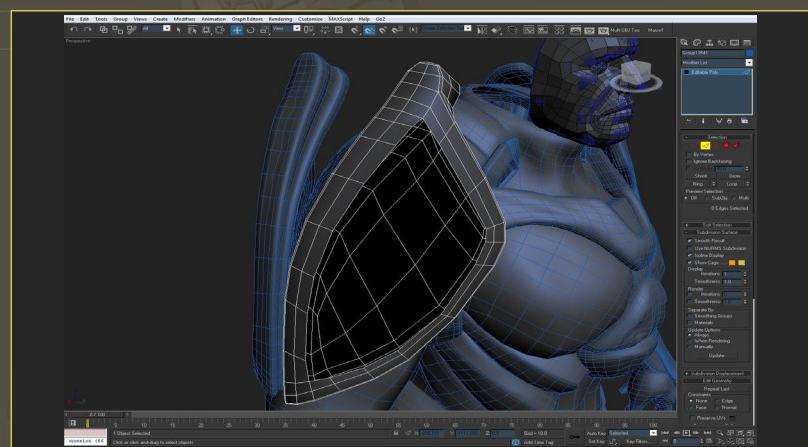


Fig 20

To complete the face extrude the eye socket boundary inwards to encompass the upper and lower eyelids, which consist of all continuous edge loops, until hitting the eye. From here, extrude inwards again to give the eye socket some depth and finally merge all of the edges into one vertex (Fig.20).

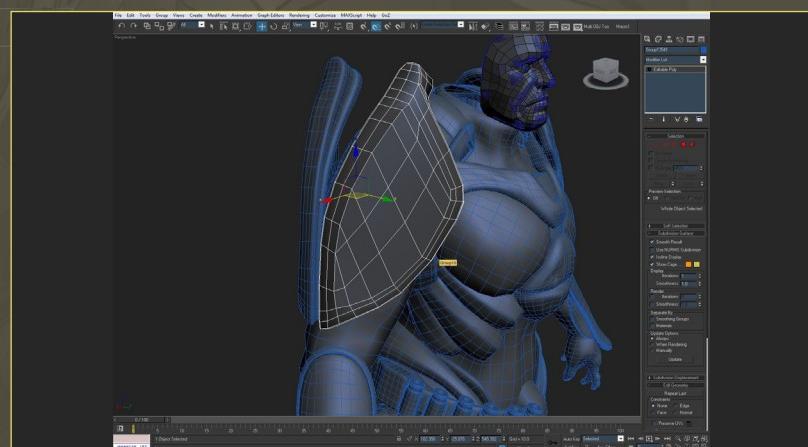
Move on to the character's right shoulder pad. Much like the base model and the sculpt, you are only going to work on one half and you will just mirror one half over in the Y axis. Begin by removing unwanted edges (mainly those running down the inner portion of the shoulder pad and the indent we previously created at the center of the pad) (**Fig.21**).

Fig 21



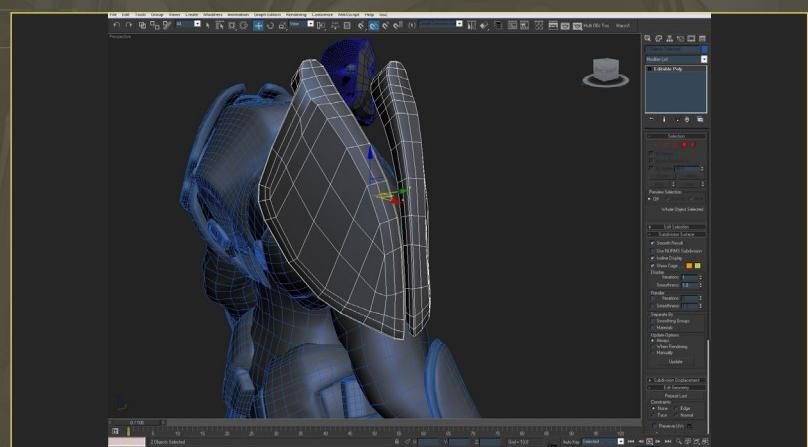
With the indent gone you can bridge the top and bottom edges of the shoulder pad to fill the gap (**Fig.22**).

Fig 22



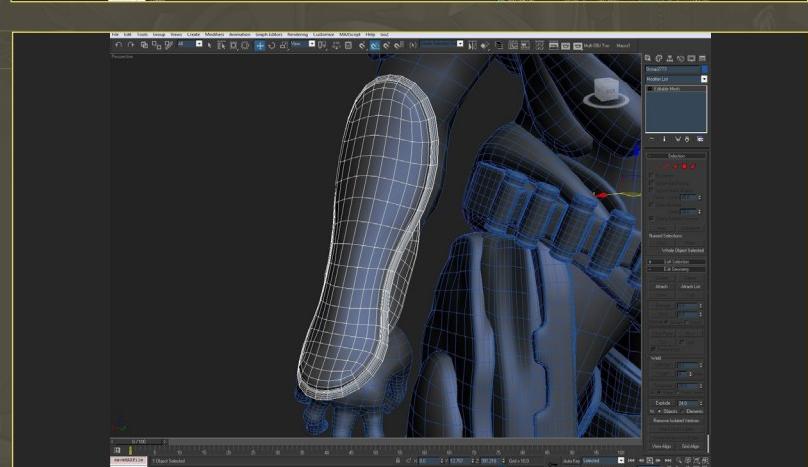
I like to leave a slight bevel when I can, to get a better Normal map bake, though for the most part any small bevels and indentations have been removed from the low poly model and will be handled in the Normal map. With one half complete, mirror it to the Y axis. These two halves will always be duplicates. The intention is to only unwrap and texture one half, which will be common practice throughout the character excluding the face and torso (**Fig.23**).

Fig 23



From here move on to the forearm plates. Unlike the sculpt, the game version of this section will be one solid mesh rather than three separate ones (**Fig.24**).

Fig 24



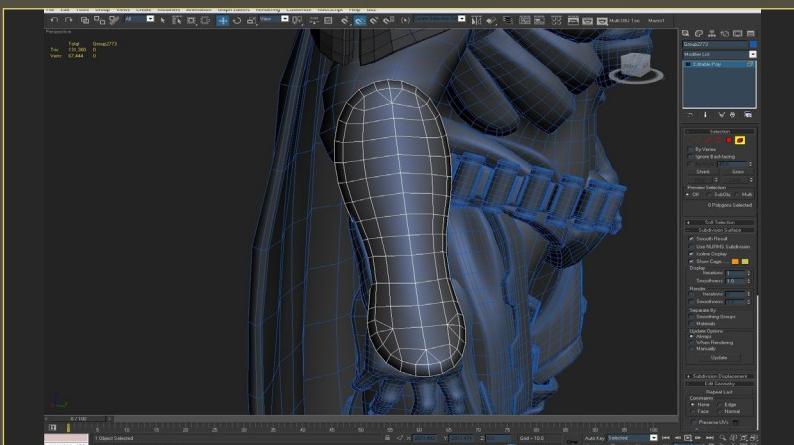


Fig 25

Like in the previous sections begin by reducing the mesh as much as you can while still retaining the same basic shape of our sculpt. Since this is a fairly rounded object, terminate a lot of the edge loops inside of the armor plate to keep it budget friendly and still have that nice smooth result (**Fig.25**).

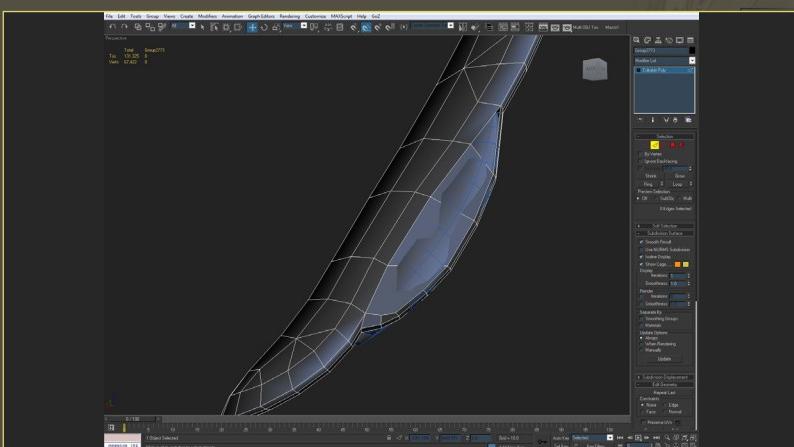


Fig 26

Once the basic shape of the plate is complete, extrude edges on either side and begin building out the smaller plates that conform more to the wrists (**Fig.26**).

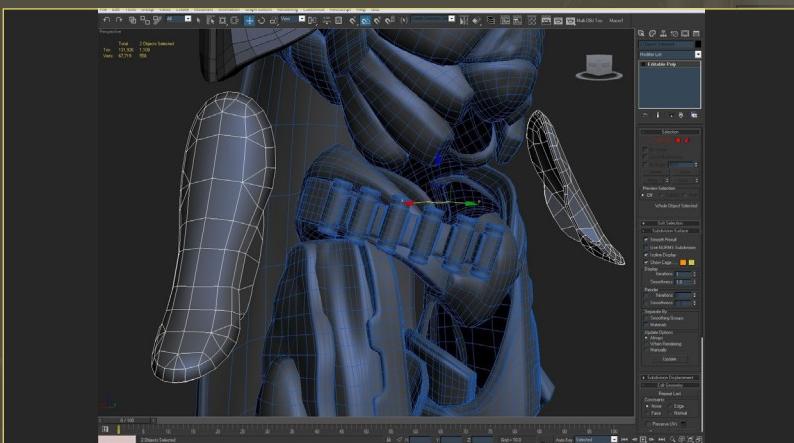


Fig 27

After the side panels have been created for the forearm plates, mirror the model in the X axis. Even though these objects will all remain duplicates - as in they will share the same UV space and textures - I still like to have them in the scene as I continue to work, as it helps give a better idea of how high my triangle count is getting (**Fig.27**).

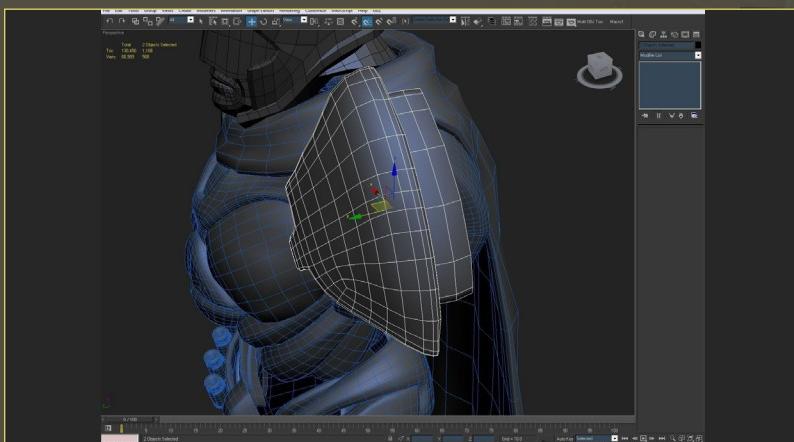
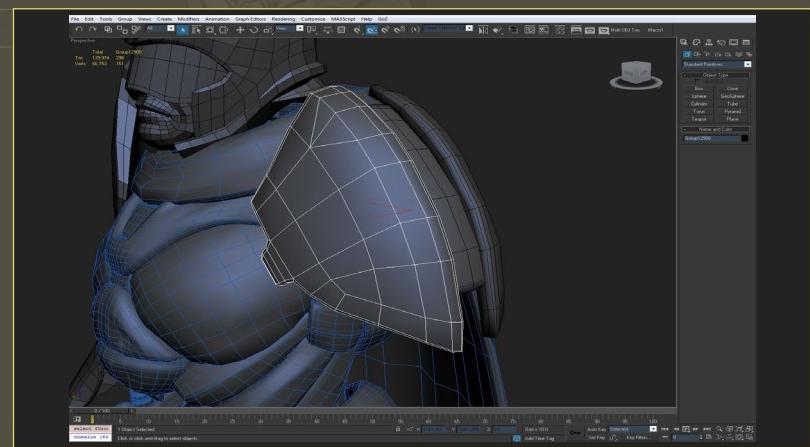


Fig 28

Moving on to the character's left shoulder pad, we will be using the same technique as we did on the right shoulder, except for the fact that this one has a panel running down the middle that will be handled as a separate element in the model (**Fig.28**).

Simply remove edges and try to devote as many edges as you can to keep the silhouette of the sculpt and retain that nice smooth profile you had in the high resolution version. Once one half is complete, mirror it in the Y axis to complete the shoulder pad (Fig.29).

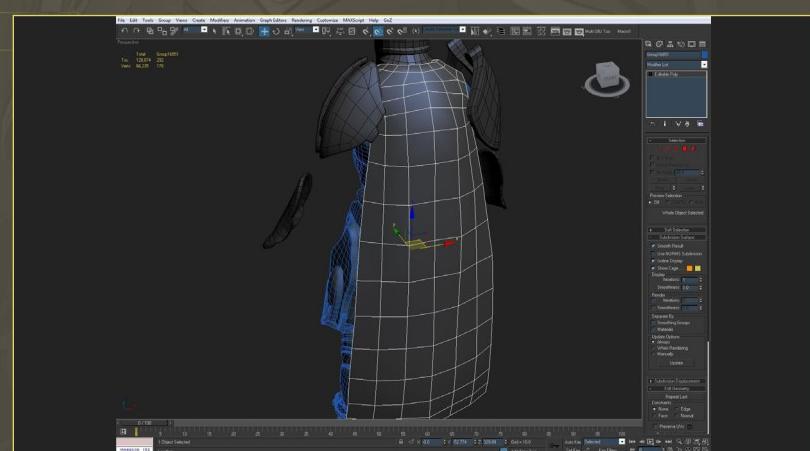
Fig 29



The character's cape is fairly straightforward.

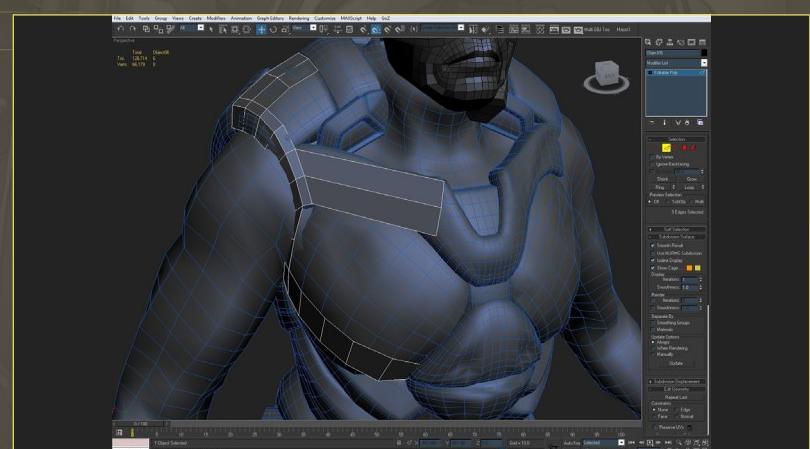
Basically remove any depth in the model and keep the outer shell, then remove a few unneeded edges. Something to keep in mind for cloth like this when using spine bones to control deformation or in game cloth simulation is that the edges need to be as evenly distributed as possible to avoid stretching. If this model was not deforming so freely, it probably could have been created with half of the triangles (Fig.30).

Fig 30



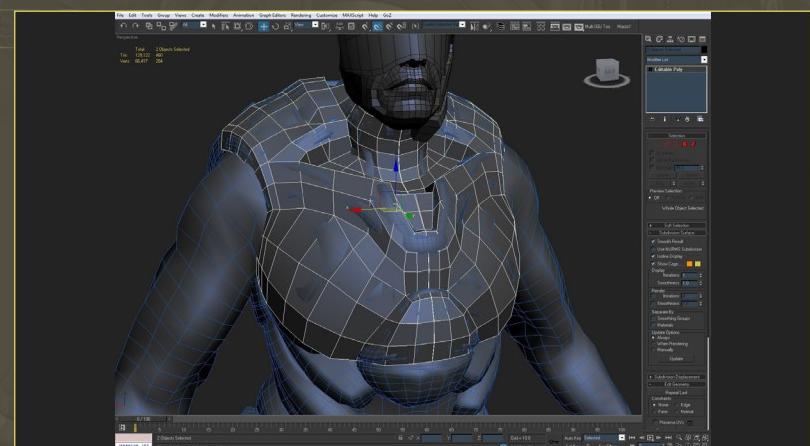
Move on to the chest piece and, ultimately, the beginning of the entire upper torso. Line the trapezius and pectoral areas with an edge ring and build out from there, marking the collar bone section and lower breastplate (Fig.31).

Fig 31



From here it is a matter of blocking out the bigger forms from our high resolution model and connecting them with edges, checking our base model as a guide. Focus on the forms of the collar bone, sternum and breastplate allowing things like seams, bolts and holes to be handled in the Normal map. As you can see in my images I am staying fairly true to the high resolution model, just with simplified geometry (Fig.32).

Fig 32



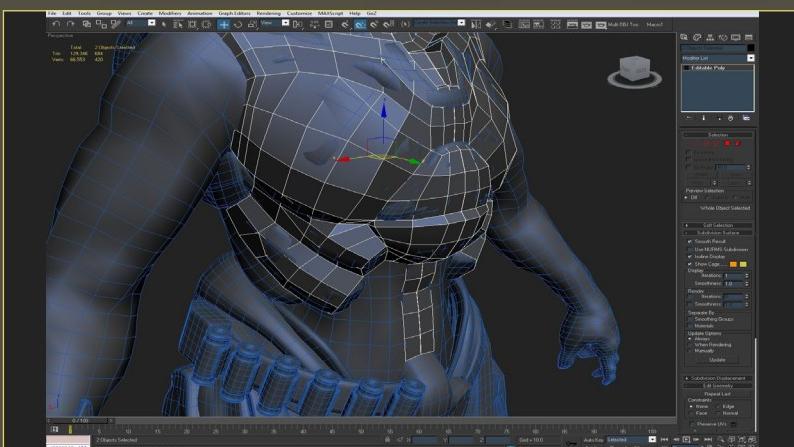


Fig 33

With the chest section of the armor complete, build downwards to include a simplified version of the rib pads, lower portion of the sternum protector and onto the organic section of the stomach under the armor (**Fig.33**).

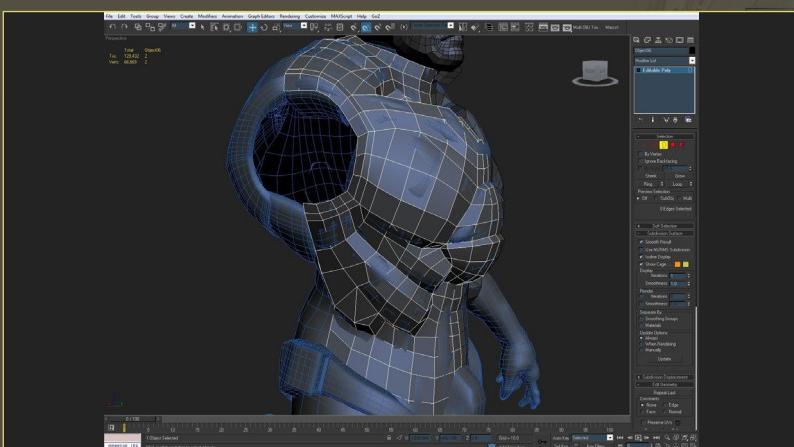


Fig 34

The midsection of the armor is composed of an organic material like rubber and will be where the character deforms most. There will be very little twisting done by this character, so leaving this section unarmored will help with movement. Add a few edge loops circling from the stomach to the back (**Fig.34**).

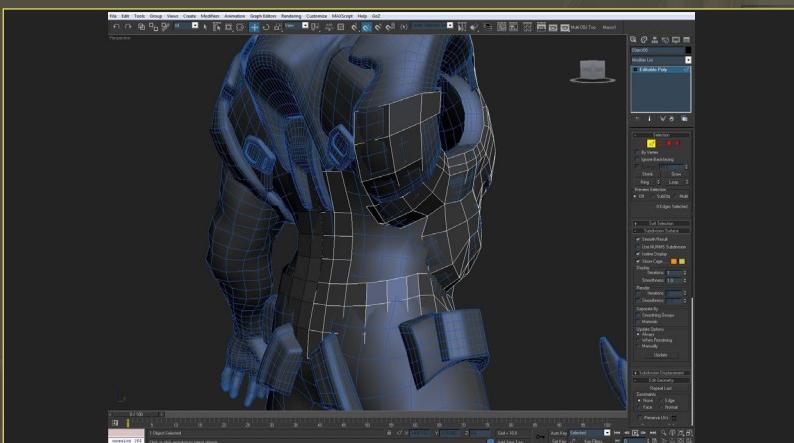


Fig 35

Continuing on to the back of our character, build outwards from the waist and armpit to begin the basic shape of the spine and shoulder blade armor sections (**Fig.35**).

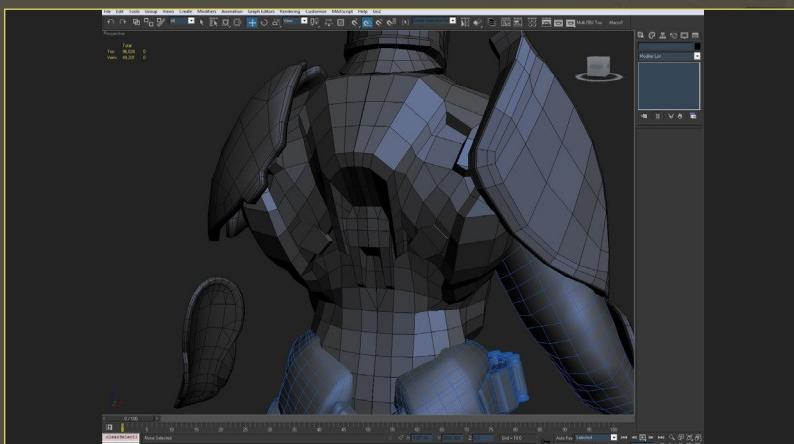


Fig 36

With the major landmarks created for the back armor it's fairly easy to go in and trace where edges need to be dropped down. Focusing on the major shapes like the shoulder blades and back pack sections, we can lay down their shape and fill in areas with bridged edges. Add the hexagon tabs and the tabs connecting to the under armor near the spine. These are mainly just for visual interest. If LOD models (lower resolution models that replace the base model at different distances from the in-game camera) were created, details like this could be removed (**Fig.36**).

Next, move on to the arm. The ribbing details you created in the high resolution version are gone and you can easily create the bulk of our low resolution version by removing many of the edges. I like to leave a few loops around the character's elbows to retain shape during deformations (**Fig.37**).

For the hands, remove the fingers and begin rebuilding them with edge extrusions from the palm. It's less time-consuming this way, as you essentially just need to extrude the edge to each knuckle and continue on to the next. For each knuckle bevel the top edges and terminate them in a triangle on the side of the finger. This helps keep the final triangle count low and will be good for deformations as the single edge at the back of the knuckle will collapse, while the two edges on the top of the knuckle will retain the shape (**Fig.38**).

With the fingers complete reduce the hand geometry by removing a few edge rings and mirror the entire arm on the X axis (**Fig.39**).

Next, move on to the armored codpiece. For this piece of armor I simply created a plane and modeled it from scratch using the base model as a guide (**Fig.40**).

Fig 37

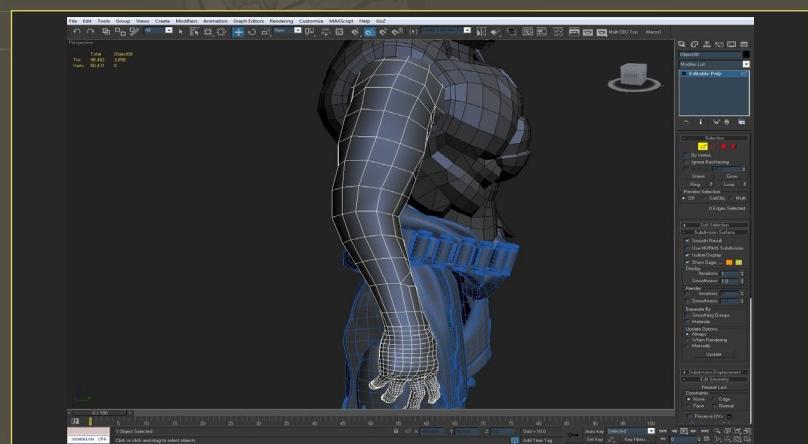


Fig 38

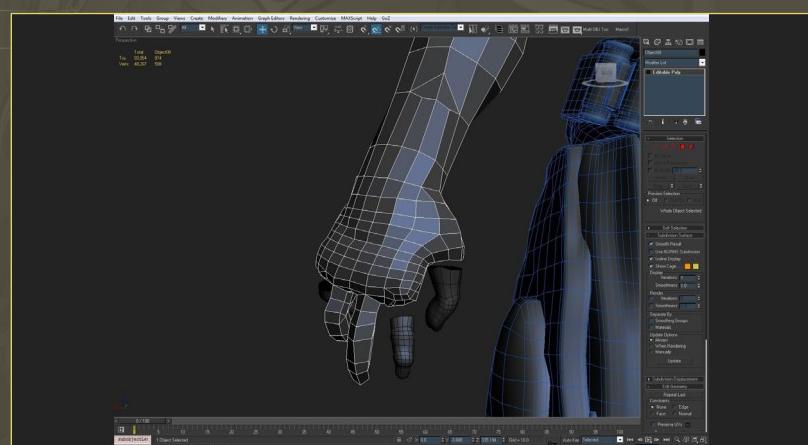


Fig 39

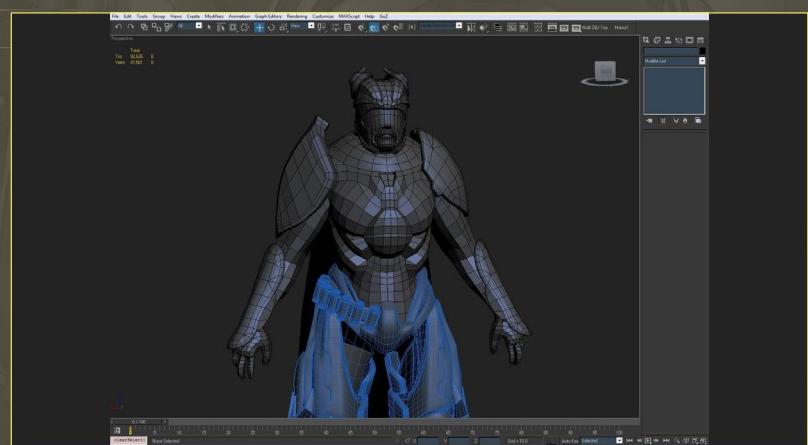
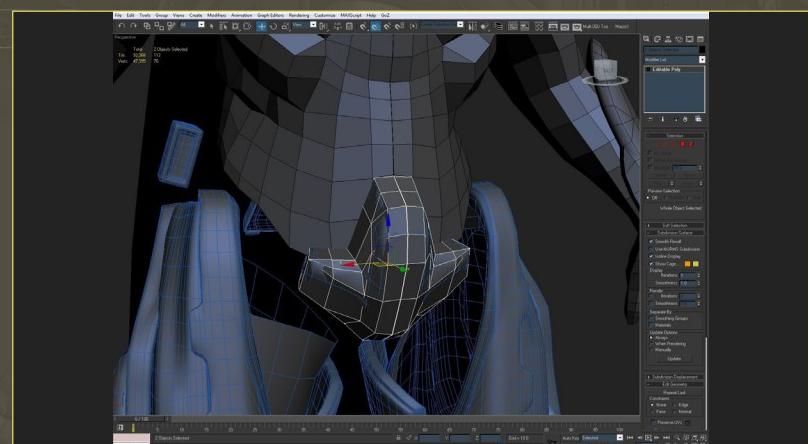


Fig 40



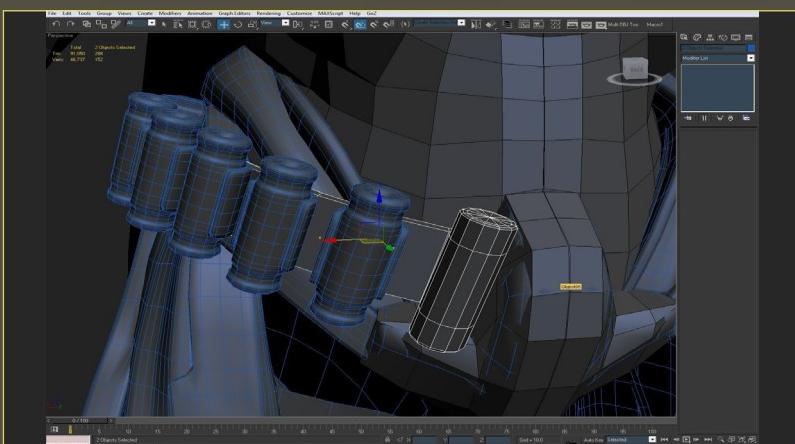


Fig 41

Moving on to the belt, simply remove a few horizontal edges from the base model and that's it. The grenades, on the other hand, take a little more work. To begin, extract the top ring on the grenade closest to the codpiece and extrude the boundary downwards to cover the entire grenade shape, leaving two horizontal edges to mark the extruded tab (Fig.41).

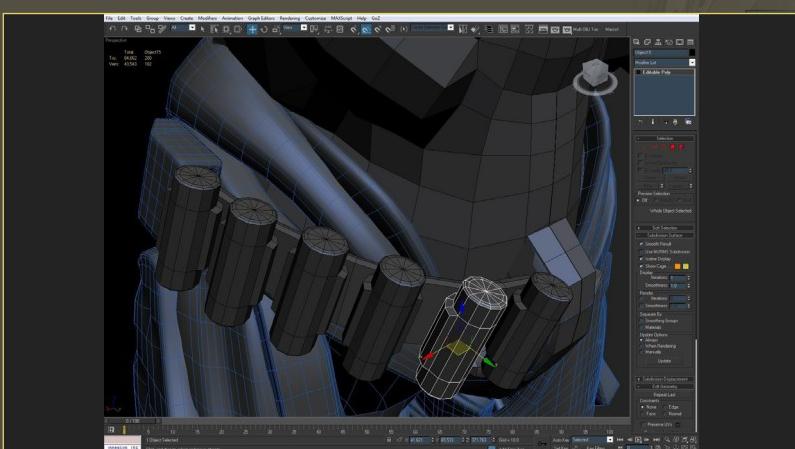


Fig 42

Next grab some faces from the center edge ring and extrude them to cover the tabbed section in the high resolution model. Bevel the top and bottom edges of the grenade so their profile is softer. On an LOD model these details would probably be among the first to be reduced, but since this model is mostly regarded as a portfolio piece this luxury will make the final presentation slightly better.

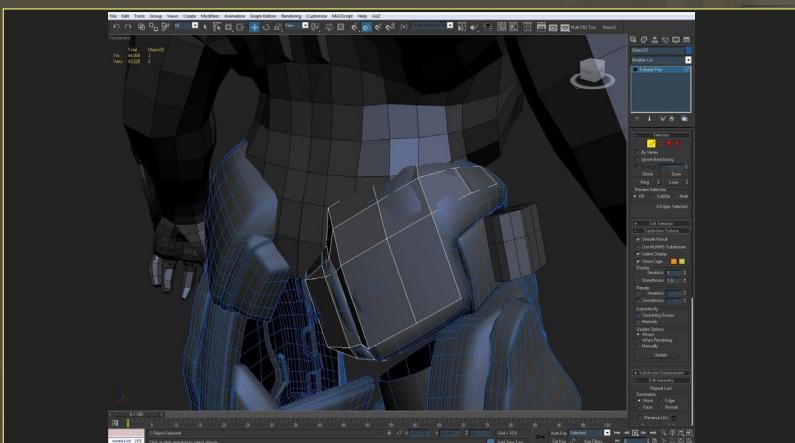


Fig 43

As you can see, all of the grenades are instances of the original one, which is closest to the codpiece. They will remain this way until the end to save UV space. When the time comes to bake Normal and Ambient Occlusion maps, simply use the original grenade and all of the information gathered from that will be carried over to the duplicate grenades (Fig.42).

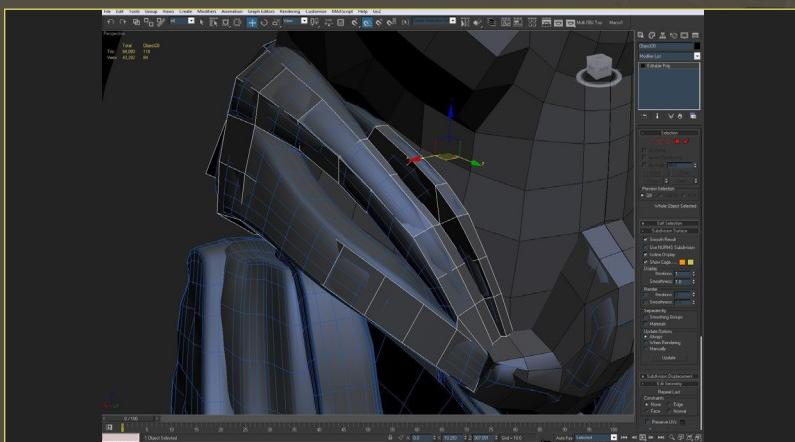


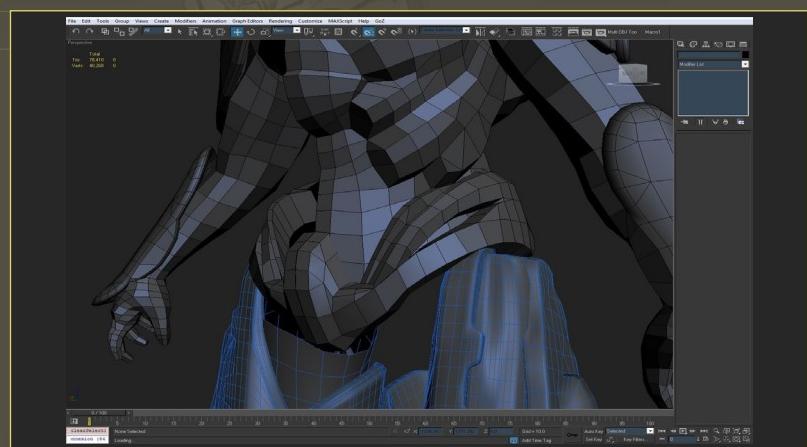
Fig 44

Move on to the hip armor and begin by blocking out the larger panel on the buttock section of the character. It is important here to mark the edges of the large bevels in the high resolution model, specifically towards the character's rib cage, as we will need to continue these edges to the front of the character (Fig.43).

Continue the edges from the back panel towards the front, following the strong edges of the wider bevels created in the high resolution model. At this stage you can begin to mark the "hole" that reveals the character's under armor, as well as the inner hip panel that would represent the character's pelvis (Fig.44).

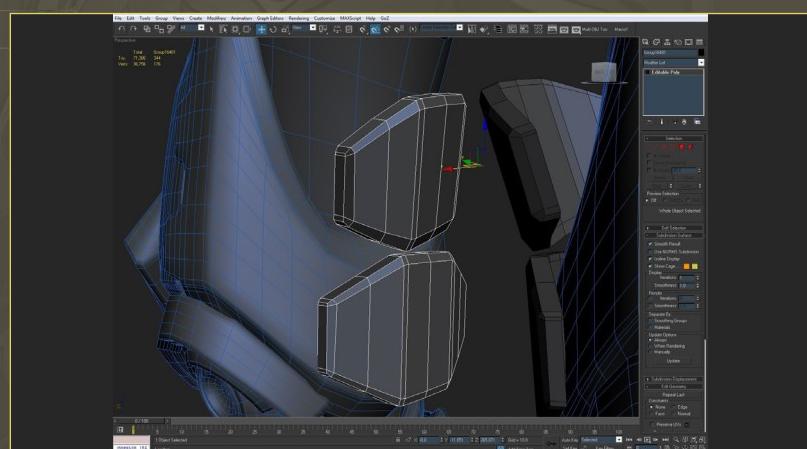
In **Fig.45** you can see the completed model, which is one continuous mesh. Merge it into the codpiece armor as it will be easier to handle this during the weighting and rigging process.

Fig 45



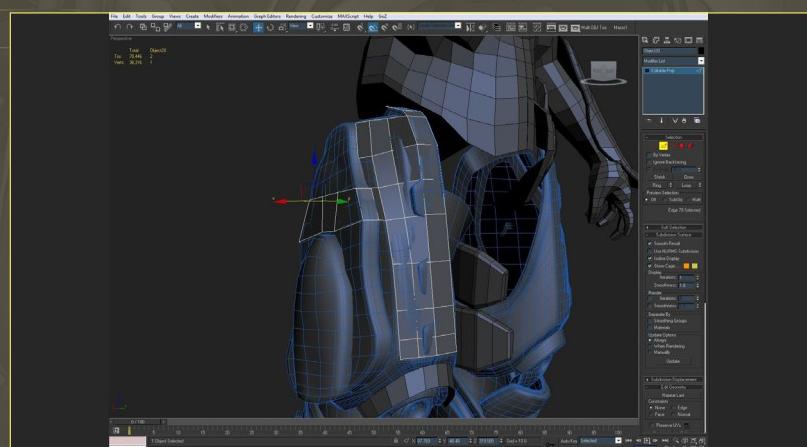
For the floating leg armor panels on the character's thighs, remove the edges that you no longer need. Do this by marking the far corners of the model and the extrusion at the center of the armor panel (**Fig.46**).

Fig 46



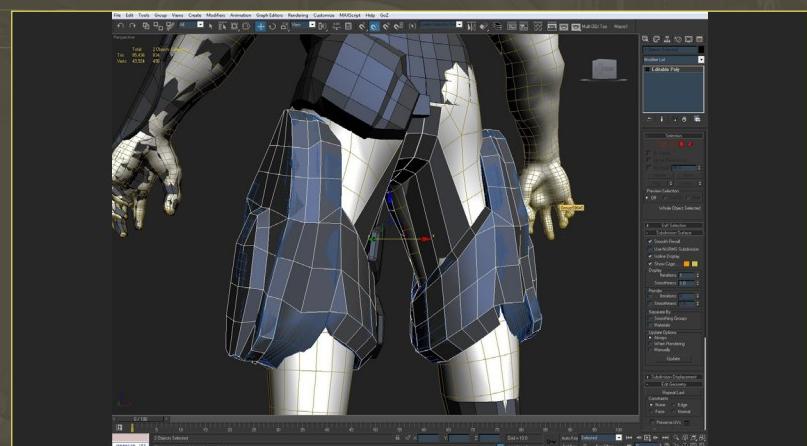
Next, move on to the upper leg armor. Although this was a complicated model in the high resolution version, it is made much easier in the low poly version since we can practically trace the outer boundaries and work from there. To retain the shape of the knee pad rim, simply remove edges from the base model (**Fig.47**).

Fig 47



The entire upper leg section is going to consist of one model, with the knee section being separate as well as the shin and then the foot armor sections. For the upper leg it is important to lay out the bigger shapes we achieved in the high resolution version, such as the outer limits of the leg armor that circles around the leg itself and the dome object on the outside of the leg. Once these are laid out, build up towards the character's crotch by marking out the character's thighs using the base model as a guide (**Fig.48**).

Fig 48



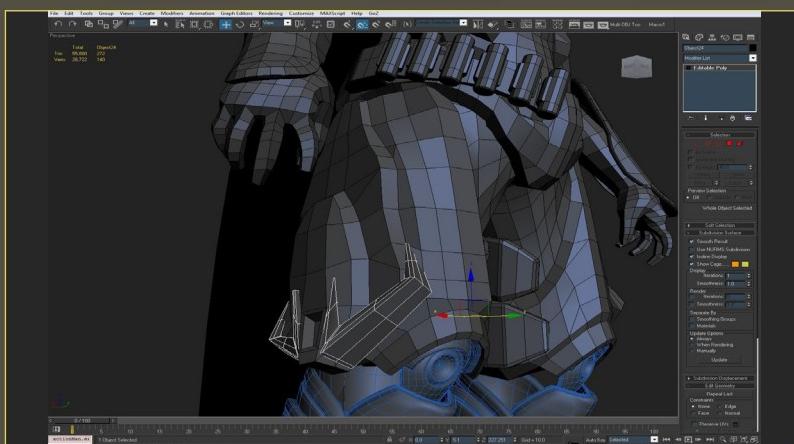


Fig 49

For the angular brackets on the outer leg armor, make them as separate objects as it is easier to handle them that way. Create them by removing unnecessary edges and by retaining the far corners of the model to keep that nice rigid shape we had in the high resolution version of the model (Fig.49).

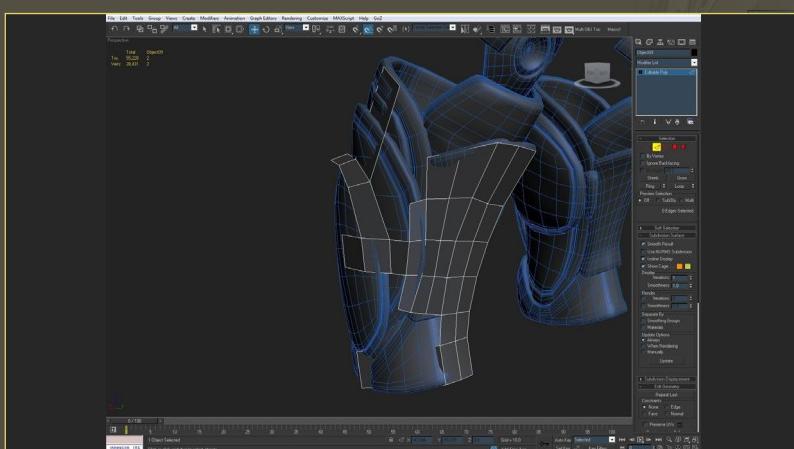


Fig 50

Next is the lower leg armor. Due to the nature of the high resolution model, we can use the shin as an anchor point of the model, but will need to build out each side as the panels are slightly askew. Build out the shin pad and work from there, starting with the right side of the lower leg, marking the extreme points of the model, which you can begin to fill in (Fig.50).

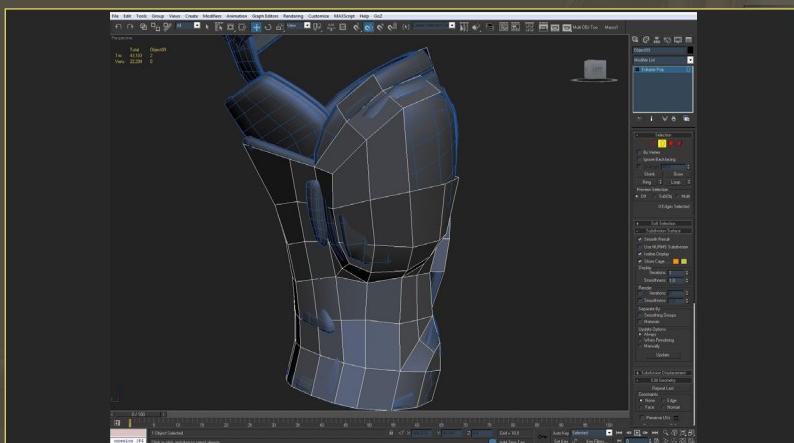


Fig 51

From here move on to the simpler, opposite side of the lower leg. The key element here is the plate that protects the calf muscle, otherwise the model is fairly straightforward and cylindrical (Fig.51).

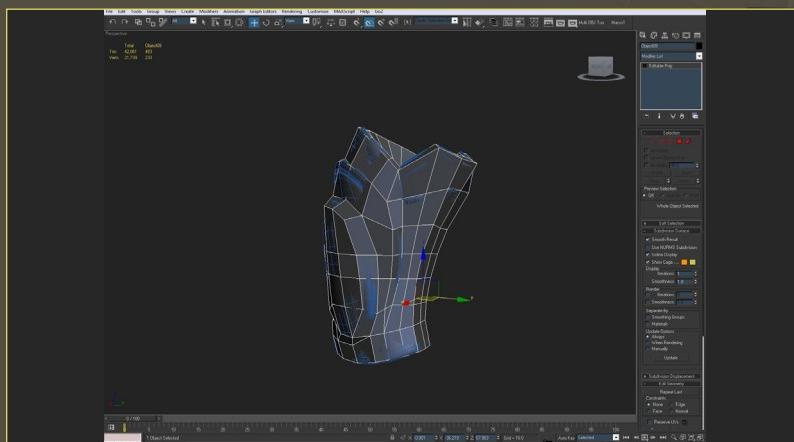
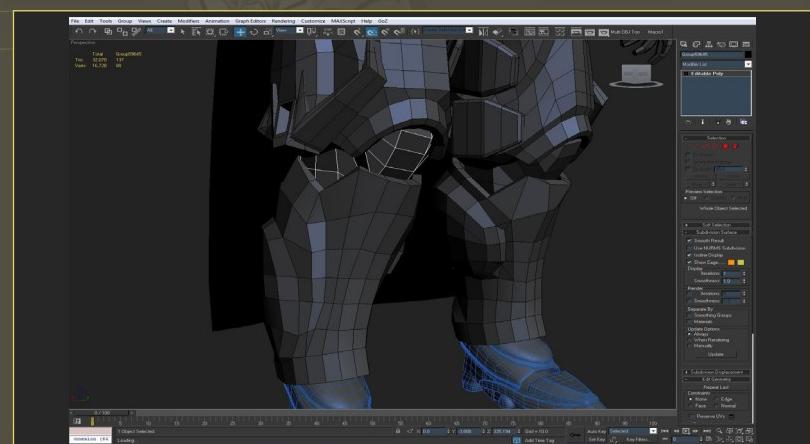


Fig 52

Bring it all together and bridge the two halves. Cap the top of the lower leg armor by extruding all of the edges in, making sure to build the back faces of the top of the shin plate, and merging them down to just one vertex. Also add support edges where needed, like where the top of the second panel will be to help keep the model profile the same as this high resolution version (Fig.52).

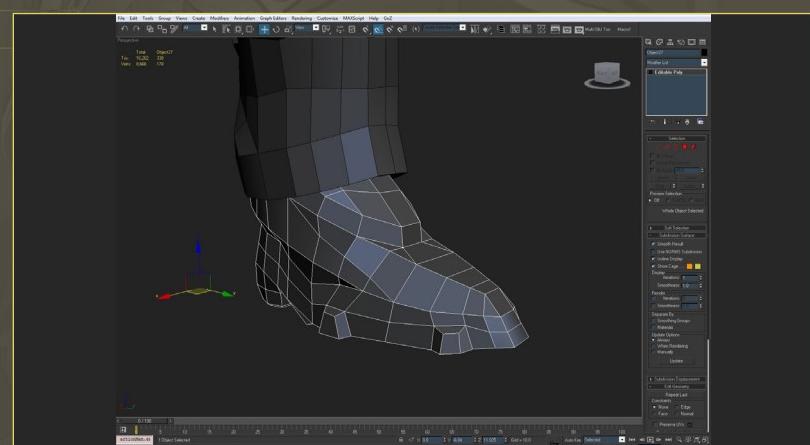
For the midsection that makes up the knee and leg under armor, take the base model of the leg, remove the faces that will always be covered by the armor plates and extrude some of the faces, pushing and pulling vertices to match where the knee pad armor will be. This section will also need to be able to deform when the leg bends, so make sure you have a few loops circling the entire leg near the knee to support this (Fig.53).

Fig 53



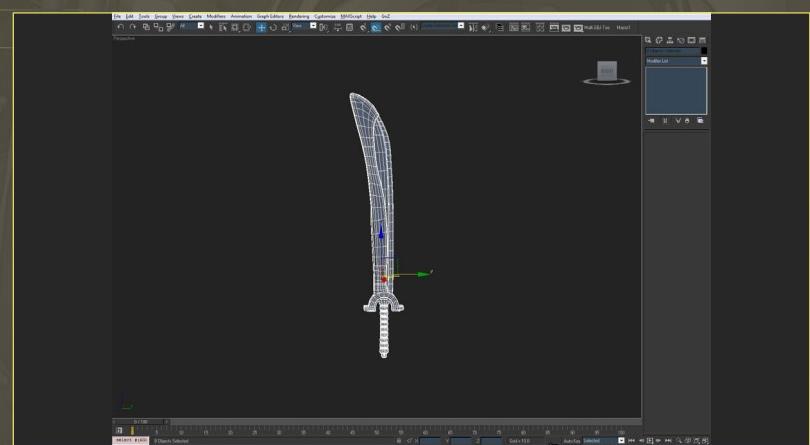
To finish off the character, extract a few faces from the boot itself to begin building out from there, incorporating elements like the armor at the top of the foot and the nubs on the side of the foot that add some visual interest. Keep areas like this fairly low frequency in detail as it is an area that isn't usually seen by the player of a video game or, at the very least, focused on. The final triangle count for the character, including the cape and grenades, is 16,202. This is a touch high, but given the nature of this character I feel that it is acceptable (Fig.54).

Fig 54



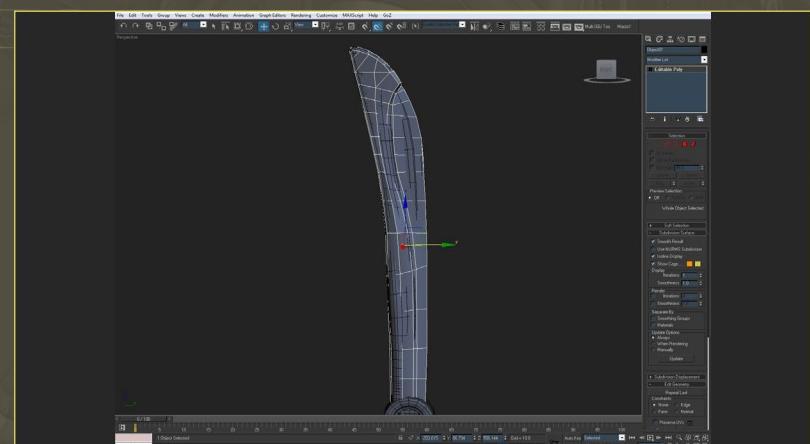
Moving on to the character's sword, begin as you did with the character itself. Import the lowest subdivision from ZBrush so you have a pretty solid starting point for your low resolution model. You have to think of the weapons as if they are simply character accessories that could be swapped in and out or upgraded along the way. This means lower triangle counts and both weapons occupying one texture sheet. If these were intended to be first person weapons, the budgets would be a bit higher (Fig.55).

Fig 55



The entire blade of the sword will be one solid mesh. The actual blades - the parts that would do the cutting - will more or less be simplified down to a box (a plane on each side and connected down the middle with a face) with the outer side of the sword retaining its thickness and the nice smooth curve we created to give the model some visual interest (Fig.56).

Fig 56



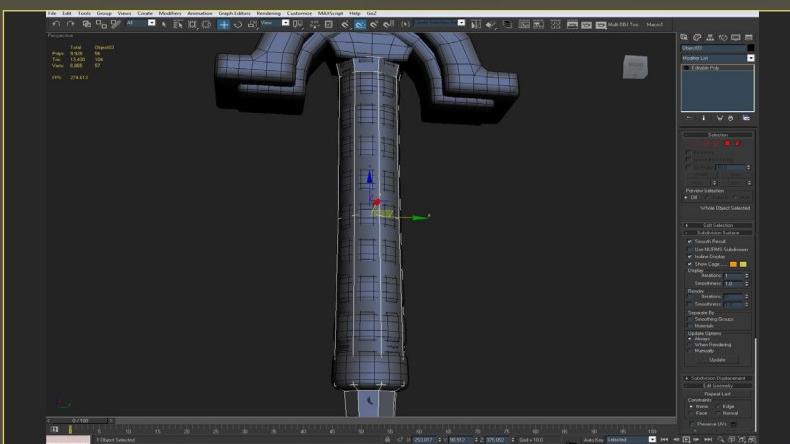


Fig 57

The handle for the sword (which will most likely be hidden by the character's hand) is a simple cylinder that fans out towards the top and incorporates the metallic cap towards the bottom (**Fig.57**).

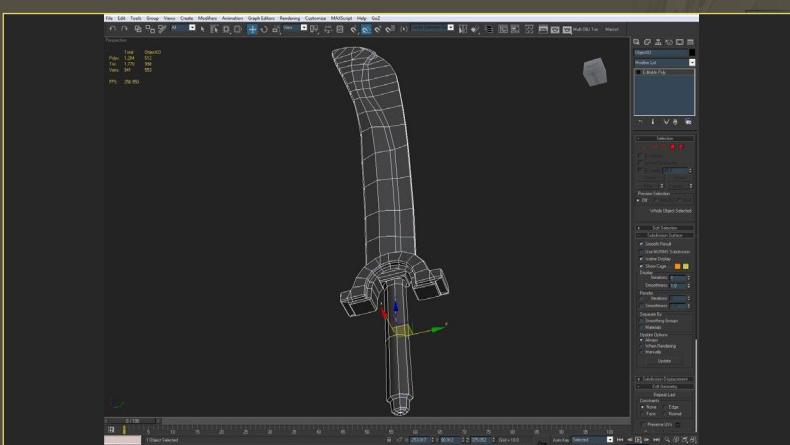


Fig 58

For the circular hilt take the top portion and reduce the edges significantly, grabbing some of the inner faces and extruding them outwards to create the same layering effect we have in our high resolution model. The connector between the hilt and handle is just a reduced version of the original, removing any bevels and keeping the shape fairly simple but still achieving the same rough shape we have in our sculpt. The final triangle count for the sword is 996 triangles (**Fig.58**).

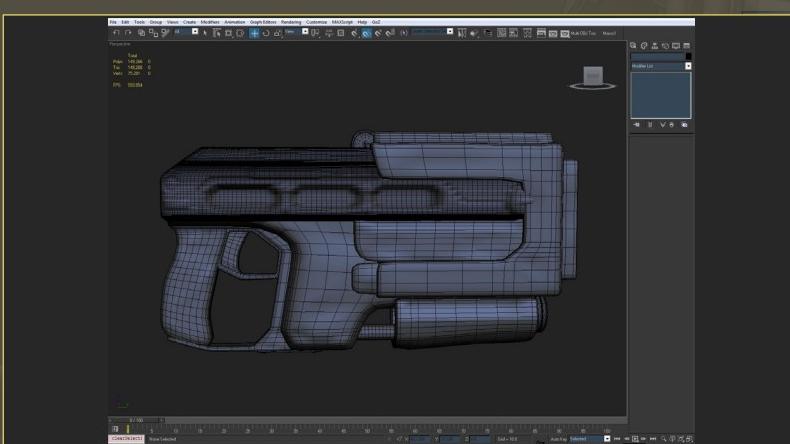


Fig 59

Finally, move on to the character's gun. Like with the sword and the character itself, bring in the lowest subdivisions from ZBrush (**Fig.59**).

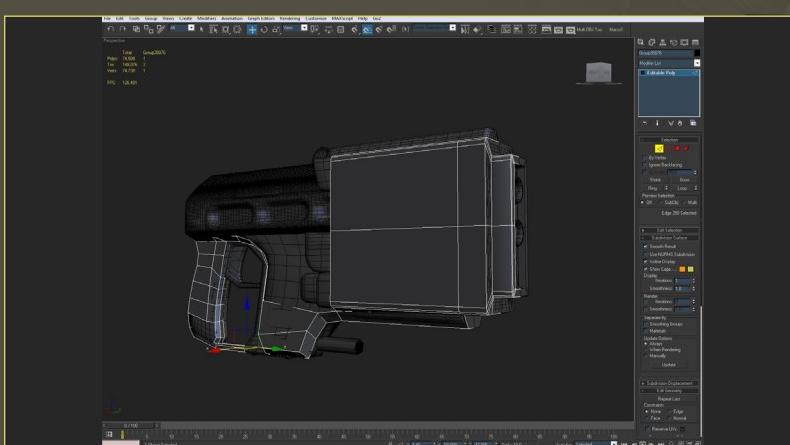
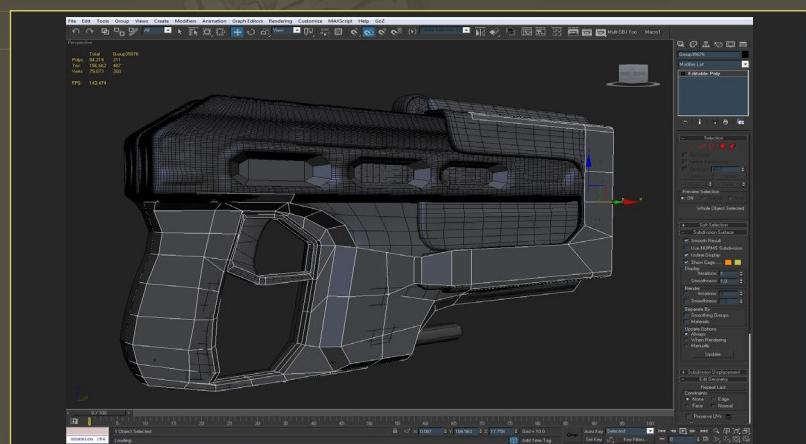


Fig 60

For most of the gun you can grab the front bracket of the gun, reduce its edges and build out from there, more or less creating the rough shape of the gun. Much like the sword, and to a certain extent many elements of the character, the gun doesn't need to deform. The key thing to keep in mind is how the low poly version will bake using the high resolution version as a target while keeping the overall triangle count at a minimum (**Fig.60**).

After blocking in the body of the gun, cut in a few edges and begin to build in the rough shape of the gun's inner panels (Fig.61).

Fig 61



Most of the gun is more or less on the same plane of depth, though the holes towards the top of the gun are fairly deep and need geometry to support them. To keep everything even create one hole and duplicate the model twice, positioning each one to line up with the high resolution version (Fig.62).

Fig 62



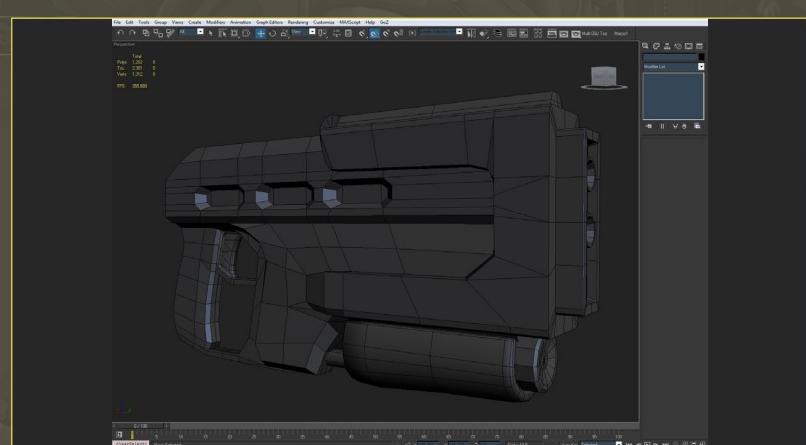
Next build out the rest of the gun by bridging these landmarks together. To help catch light and again, be slightly more visually interesting for display, retain the definition between the inner and outer panels of the gun (Fig.63).

Fig 63



To finish off the character's gun, remove many of the edges from the front grip and create the rails and top cylinder by removing faces and edges that add nothing to the gun's silhouette. The final triangle count for the gun is 2,301 (Fig.64).

Fig 64



GAVIN GOULDEN

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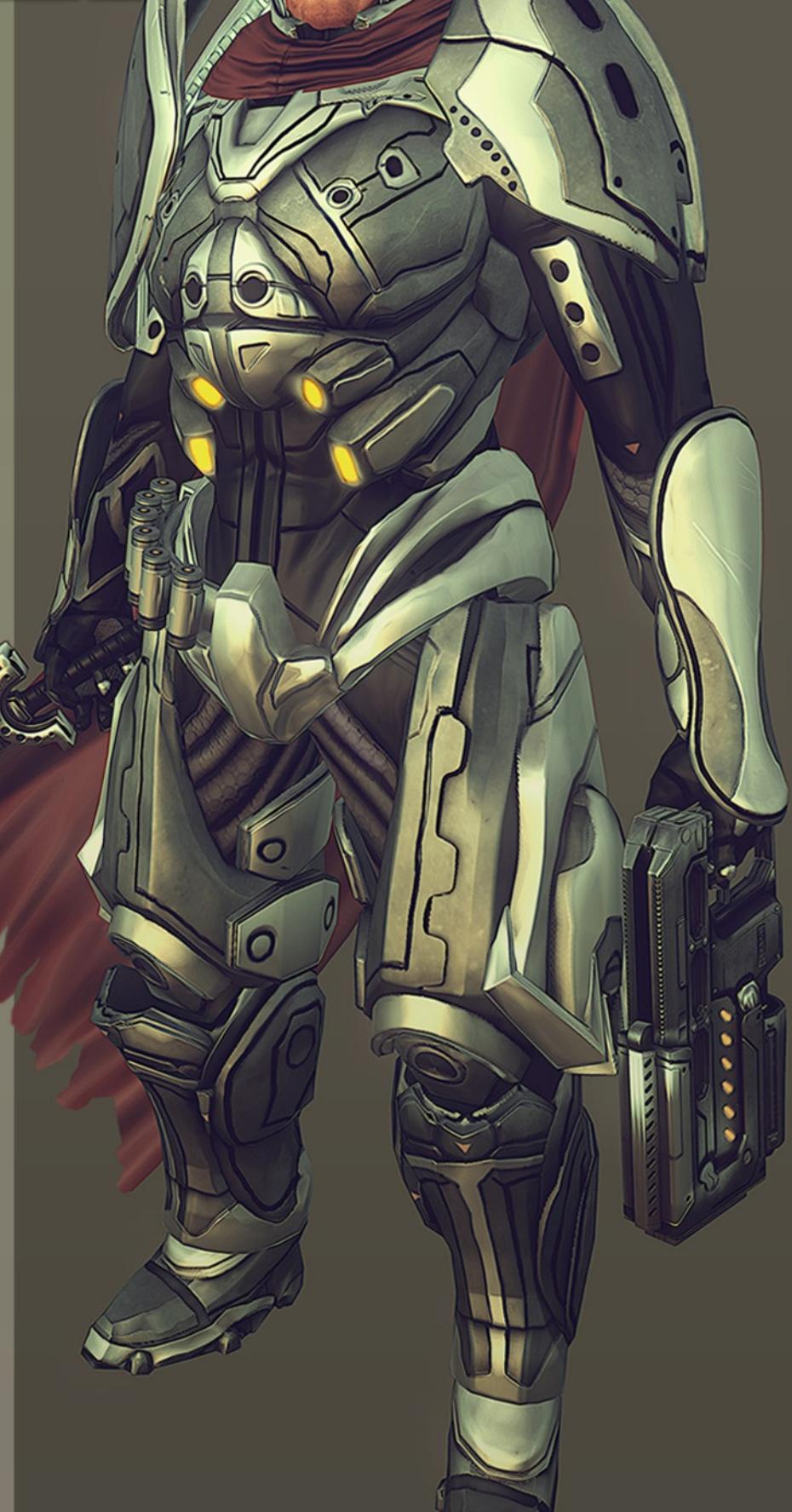
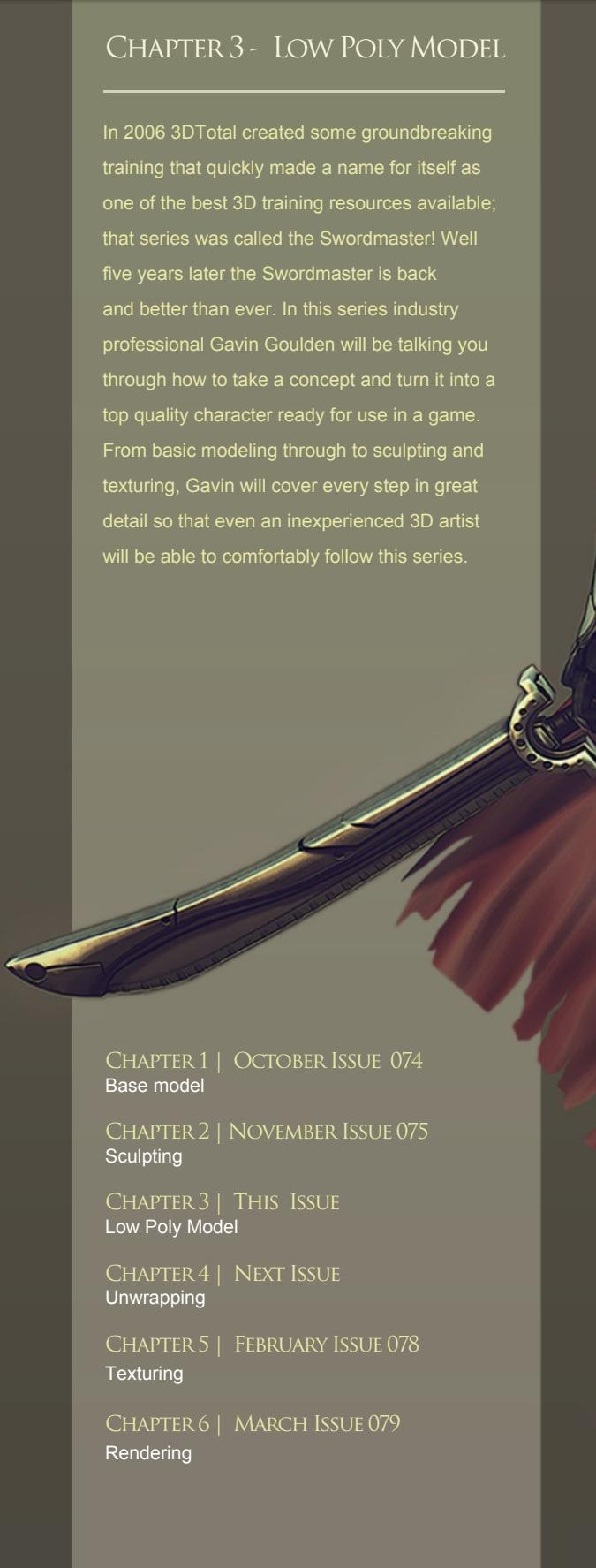


Maya

SWORDMASTER 2

CHAPTER 3 - LOW POLY MODEL

In 2006 3DTotal created some groundbreaking training that quickly made a name for itself as one of the best 3D training resources available; that series was called the Swordmaster! Well five years later the Swordmaster is back and better than ever. In this series industry professional Gavin Goulden will be talking you through how to take a concept and turn it into a top quality character ready for use in a game. From basic modeling through to sculpting and texturing, Gavin will cover every step in great detail so that even an inexperienced 3D artist will be able to comfortably follow this series.



CHAPTER 3 - LOW POLY MODEL

Software used: Maya

INTRODUCTION

In this chapter we will be creating the actual in-game mesh (also known as a render mesh) that will eventually be posed and presented as if it were a true character asset for a current generation video game.

I like to begin my low poly models by bringing in the ZBrush model at its lowest subdivision level. This gives you a pretty solid guide to start from and means you can more or less trace the model when creating the final game mesh. This is a similar philosophy to the one exercised in previous steps when we created a cleaner base mesh from our sketch sculpt.

Before modeling analyze what the low poly model will actually consist of. Where you can duplicate objects, which parts are symmetrical, where will you need to put natural geometry seams for better unwrapping, how much you can accomplish with simplified shapes and fewer overlapping pieces etc.

It is also important to note that the three key points to low poly modeling are: having a model that falls under budget (this greatly depends on the nature of the model; in this case we are going to go a little higher than normal as this model would be considered a hero character and ultimately a portfolio piece), that easily deforms (focusing on proper topology so that the character can have enough geometry to bend/retain shape when animated and still be within budget) and that will have enough geometry to capture details from the high resolution model without too many artifacts (going too low can cause baking errors, going too high can break the budget). All of these things need to be accomplished while maintaining the rough silhouette achieved in our sculpt (**Fig.01**).

Fig 01



Fig 02

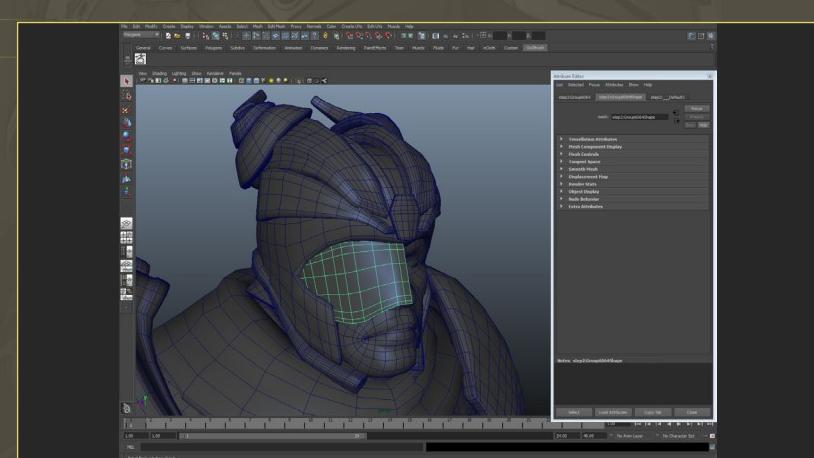


Fig 03

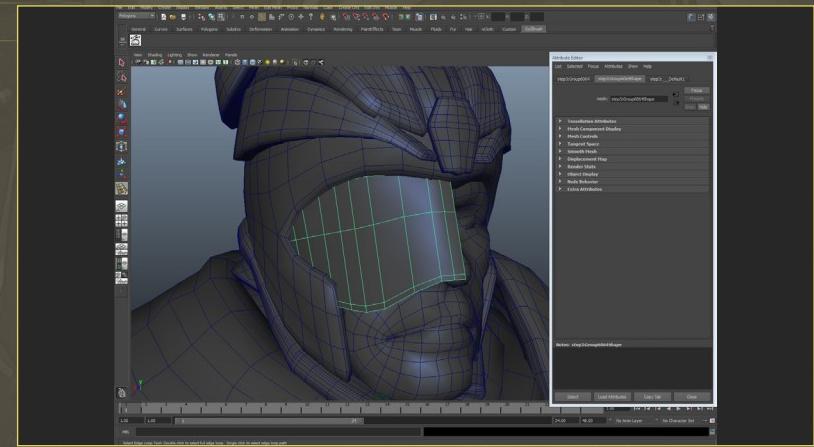


Fig 04



Not all of the pieces of this model will need to be created from scratch. Many different pieces can be created quickly by removing unneeded edges. An example of where this will work is the character's visor (Fig.02).

First split the entire thing down the middle by removing half of the faces on one side and removing all of the back faces that gave the sculpt depth. The key here is to retain the rough shape of the model without making a mesh that is too dense (Fig.03).

For the most part the visor is practically a straight plane running from the forehead to the nose. Therefore you don't need a lot of geometry to keep its original shape. However, since the visor wraps around the character's face and has a slight curve on the bottom, more vertical edges are needed to keep this shape nice and smooth (Fig.04).

Once all of the unnecessary edges have been removed, the model can be duplicated and mirrored on the X axis. The two halves are then combined into one solid mesh with the vertices welded down the middle. This is basically the same technique that will be carried out in all future steps. The character is mostly symmetrical in either the X or Y axis excluding a few details that are layered over the top of the original model, which will be handled separately (Fig.05).

Moving on to the helmet itself, take a face off of the original model and begin building out using the edge extrusion method shown earlier (Fig.06).

Create edges where the jaw protector will need to be modeled and line the inner edge of the brow line. From here extrude edges out to the overlapping fins, which will all be incorporated to one solid mesh (Fig.07).

Wrap the edges around the back of the head again, using the base model as a guide for

Fig 05

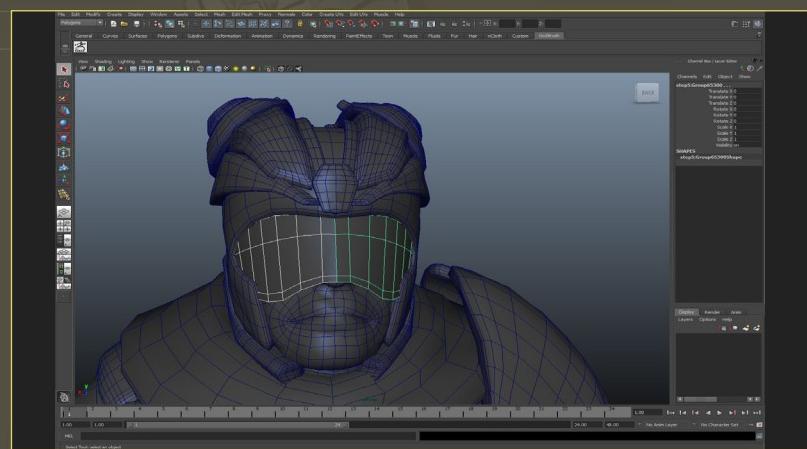


Fig 06

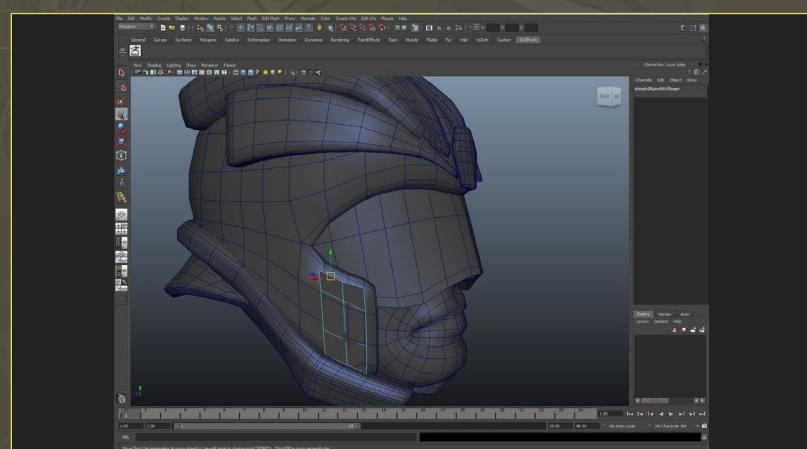


Fig 07

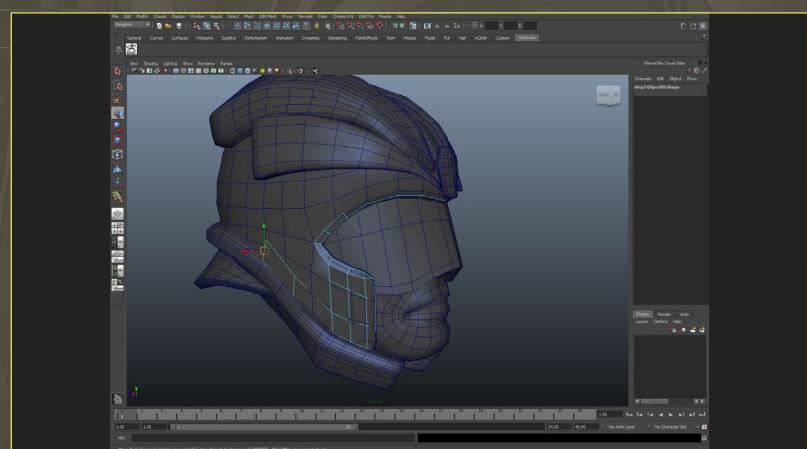
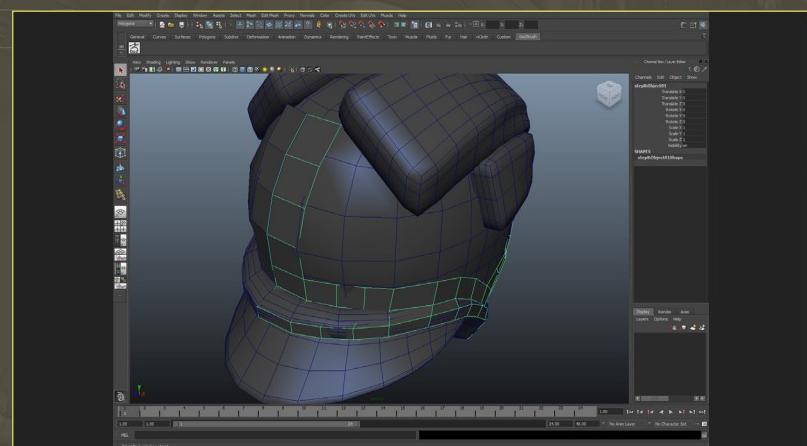
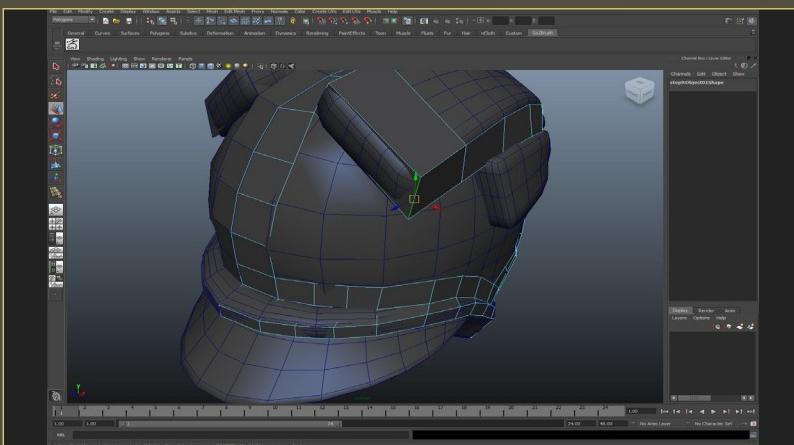
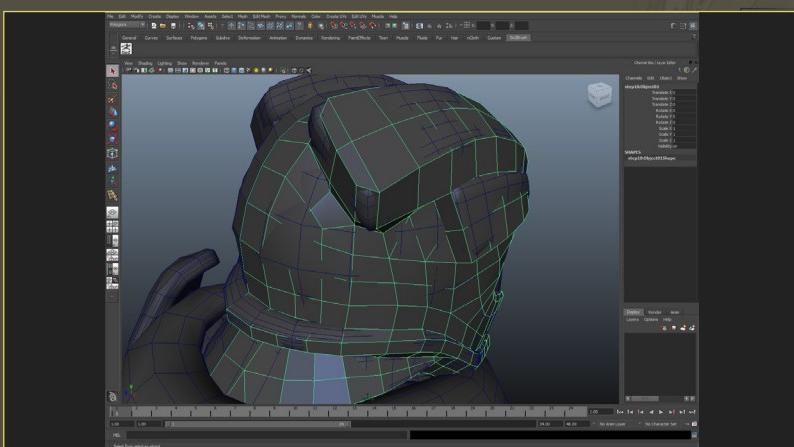


Fig 08

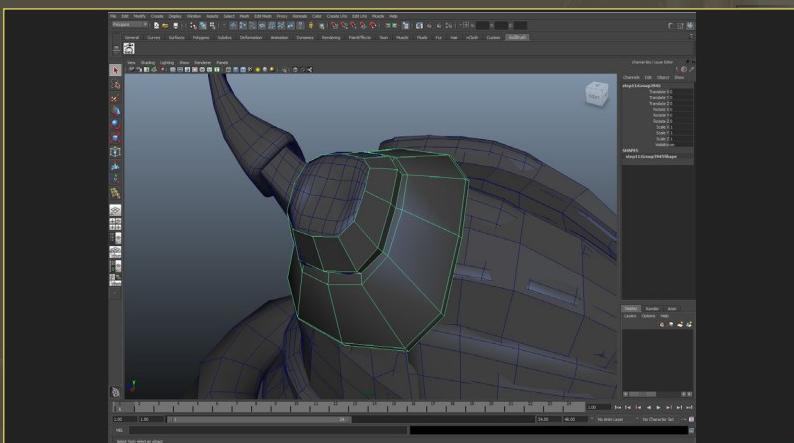



Fig 09

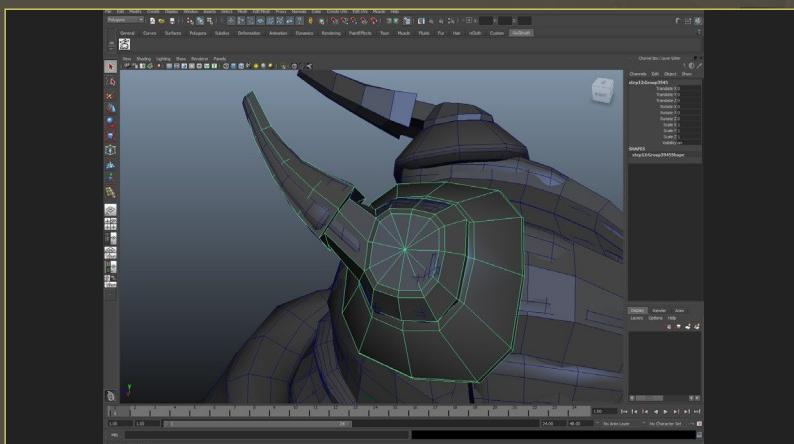
where to drop the edges. The key here is to roughly mimic the base shape we had on our sculpt with the game resolution faces lightly intersecting the original model (**Fig.08**).


Fig 10

Extrude edges up around the cranium portion of the helmet to act as a sort of anchor point for all of the other details that will need to be incorporated. This helps avoid any un-smooth edges and headaches. Once these edges have been placed begin building out from there and model around the fins on the side of the head. You only need to be concerned with the bigger, lower frequency details here; the smaller details in our sculpt will just be in the Normal map (**Fig.09**).


Fig 11

Building from the larger fin, move on to the lower portion and run those edges down to the front of the helmet. At this stage build out the jaw protector and neck fin, which are still all part of the one helmet mesh (**Fig.10**).


Fig 12

The only floating portion of the helmet other than the visor that can be removed or added for character variation is the antennas at the top of the head. For these, much like the visor, split off the base portion and remove most of the horizontal and vertical edges. Model the layered effect that was in the sculpt section by section until you cap it at the top of the model. This adds to the visual interest and makes it easier to add the actual antenna horns (**Fig.11**).

Grab a few faces from the back of the antenna base and extrude them outwards to match the general flow of the antennas. From there add the layering effect from the actual antenna to the chunk connecting it to the antenna base (**Fig.12**).

Move on to the face. Excluding the under armor sections, this is the only organic section of the model. Unlike the armor pieces there is more of a focus on proper topology here as the mesh would ideally need to be able to deform when animated. Generally hard surface objects like armor plates do not bend, so the focus for them is usually retaining a smooth shape rather than continuous edge loops.

To begin, grab a face off of the bridge of the nose and create a separate object. Instance that object on the X axis and begin adding some depth by building outwards using the edge extrusion method (**Fig.13**).

Move on to the line of the nose and work towards the edge of the lips, devoting a few edge loops that will eventually circle the entire mouth, much like the muscles that work underneath the skin (**Fig.14**).

Next extrude a ring around the character's lips, keeping the same rough shape as indicated in our sculpt. Try to devote enough geometry to the mouth, so that it can squash and stretch as needed when animating during expressions and lip syncing. Devote a few edges to the corner of the mouth. You should do this by adding one edge between the lips and one for the top and lower lip (**Fig.15**).

Extrude the edges inwards to complete the lips, adding one edge circling on the lips to give them some depth. From here build outwards using the borders we previously constructed to start forming the chin and nasal folds. Give the mouth two or three loops around the outside and terminate the third with a star just under the corner of the nose, as it is a relatively safe area to have five edges connect (**Fig.16**).

Fig 13

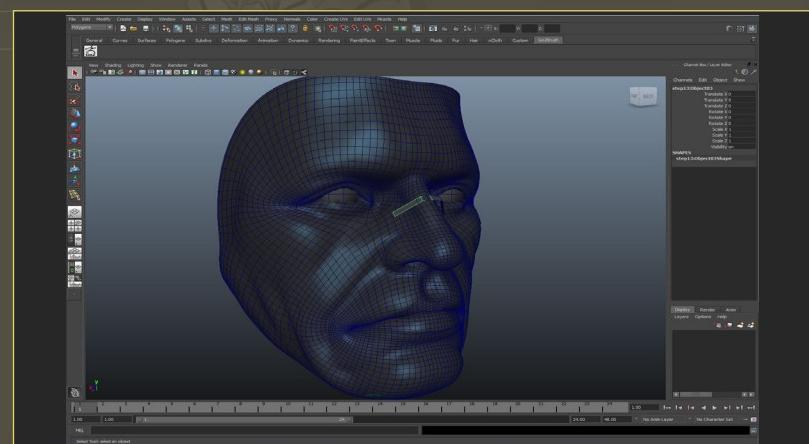


Fig 14



Fig 15

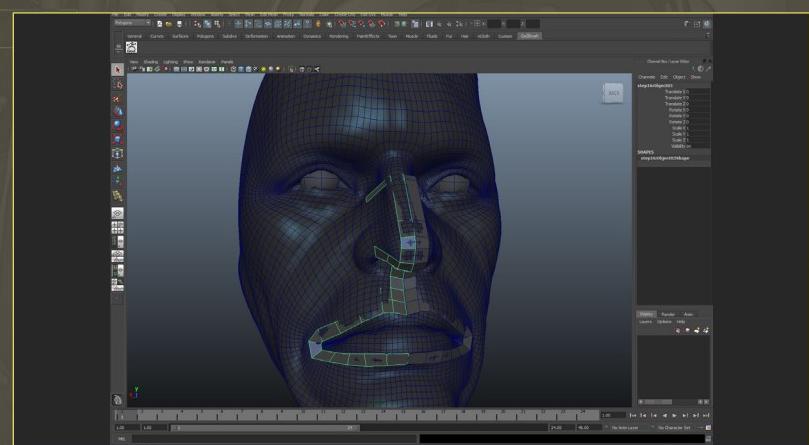
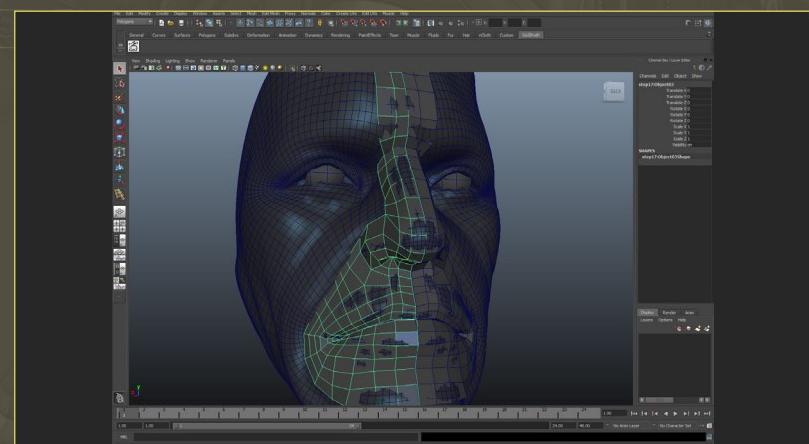
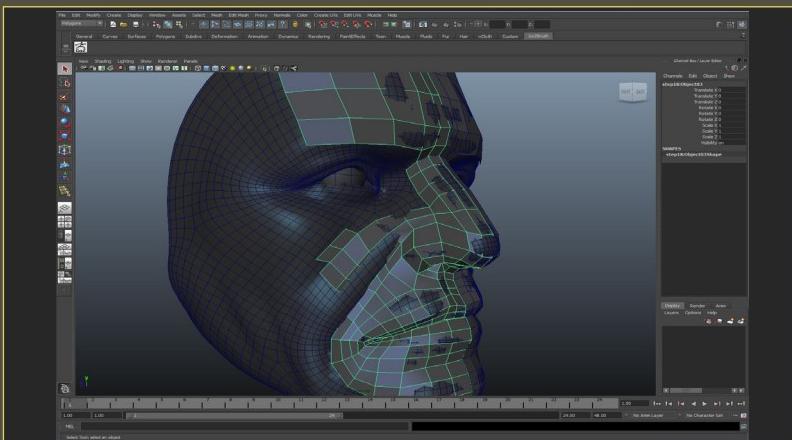
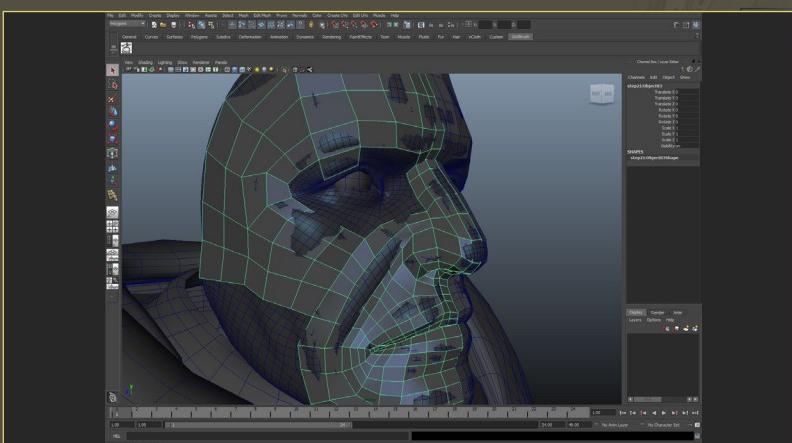


Fig 16

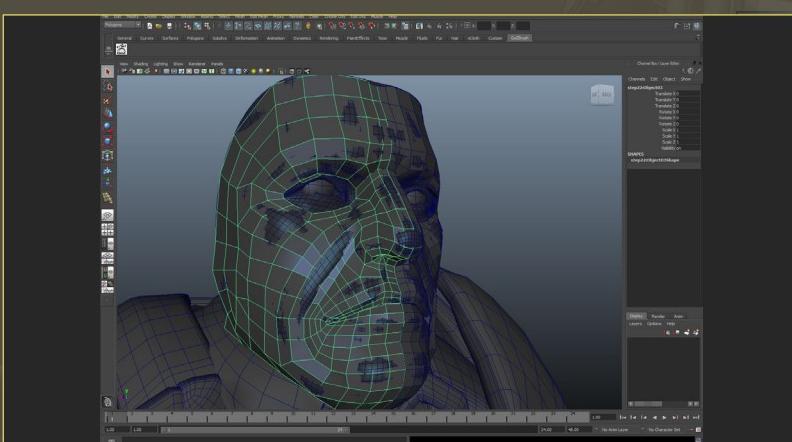



Fig 17

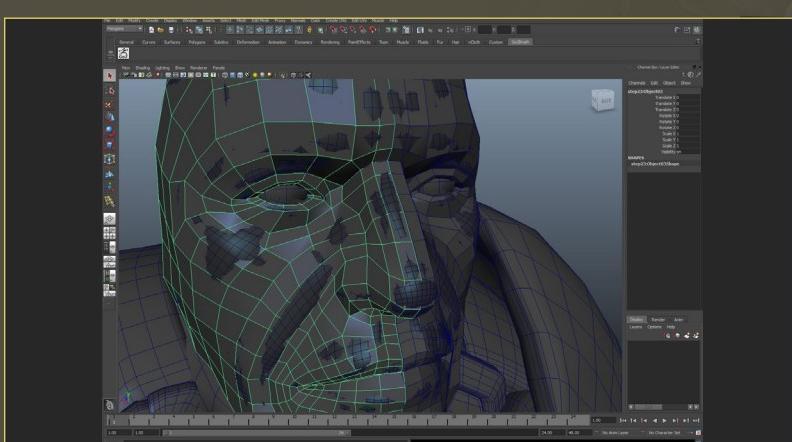
Next build out edges over the nostrils and continue them down the cheeks. I find this helps define smile lines and the fat a character like this would have in this section of his face. It is also an area that can stretch along with the mouth, so continue the edges right down to the chin and neck (**Fig.17**).


Fig 18

For the most part try to connect the eyebrow muscles to the top corners of the upper lip with a few edges. This will help retain the face's natural shape during extreme stretching poses and will also help that deformation seem more natural, as the flesh on a character's cheeks is generally affected when the mouth opens and closes (**Fig.18**).


Fig 19

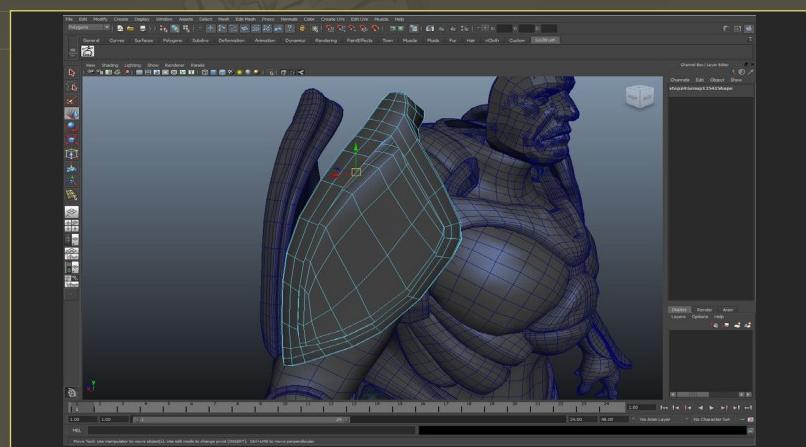
Next create the eye sockets and begin to outline the general shape of the eyeball and lids, as well as extrude the boundary edges outwards to complete the rough shape of the face (**Fig.19**).


Fig 20

To complete the face extrude the eye socket boundary inwards to encompass the upper and lower eyelids, which consist of all continuous edge loops, until hitting the eye. From here, extrude inwards again to give the eye socket some depth and finally merge all of the edges into one vertex (**Fig.20**).

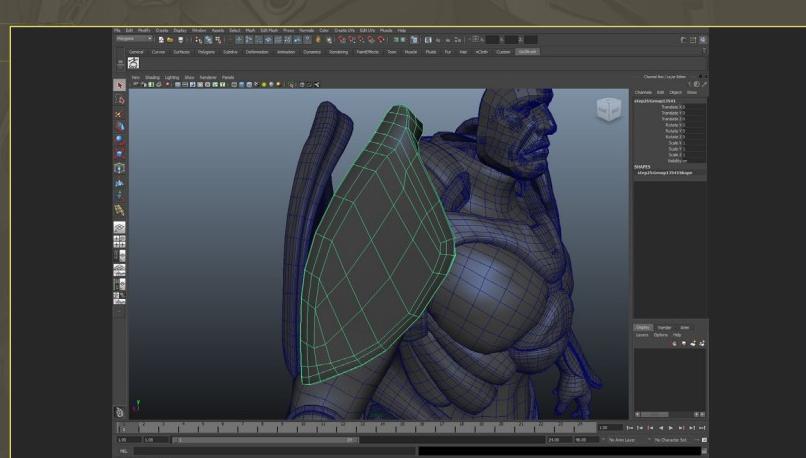
Move on to the character's right shoulder pad. Much like the base model and the sculpt, you are only going to work on one half and you will just mirror one half over in the Y axis. Begin by removing unwanted edges (mainly those running down the inner portion of the shoulder pad and the indent we previously created at the center of the pad) (**Fig.21**).

Fig 21



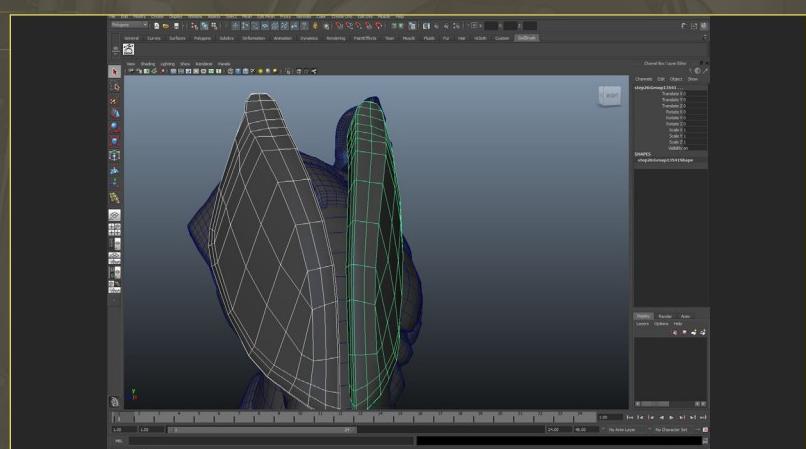
With the indent gone you can bridge the top and bottom edges of the shoulder pad to fill the gap (**Fig.22**).

Fig 22



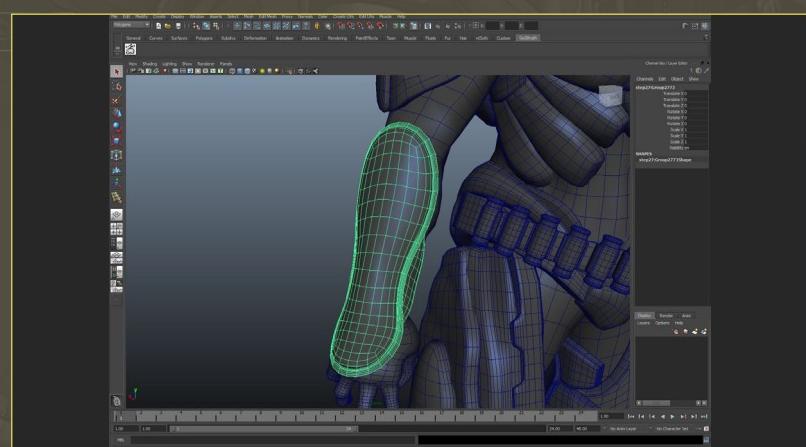
I like to leave a slight bevel when I can, to get a better Normal map bake, though for the most part any small bevels and indentations have been removed from the low poly model and will be handled in the Normal map. With one half complete, mirror it to the Y axis. These two halves will always be duplicates. The intention is to only unwrap and texture one half, which will be common practice throughout the character excluding the face and torso (**Fig.23**).

Fig 23



From here move on to the forearm plates. Unlike the sculpt, the game version of this section will be one solid mesh rather than three separate ones (**Fig.24**).

Fig 24



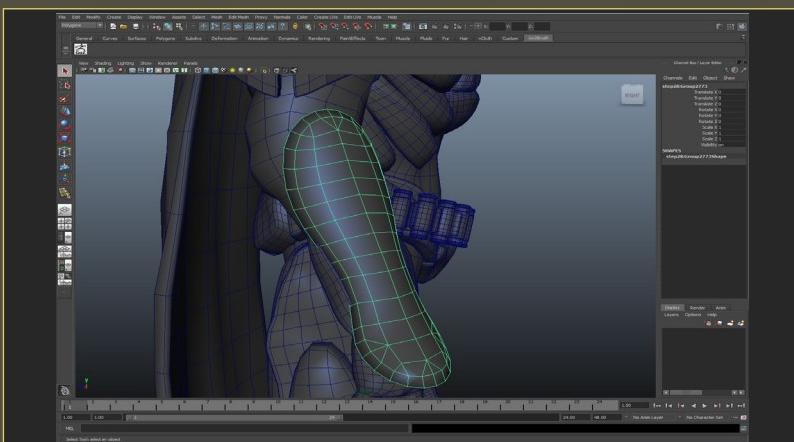


Fig 25

Like in the previous sections begin by reducing the mesh as much as you can while still retaining the same basic shape of our sculpt. Since this is a fairly rounded object, terminate a lot of the edge loops inside of the armor plate to keep it budget friendly and still have that nice smooth result (Fig.25).

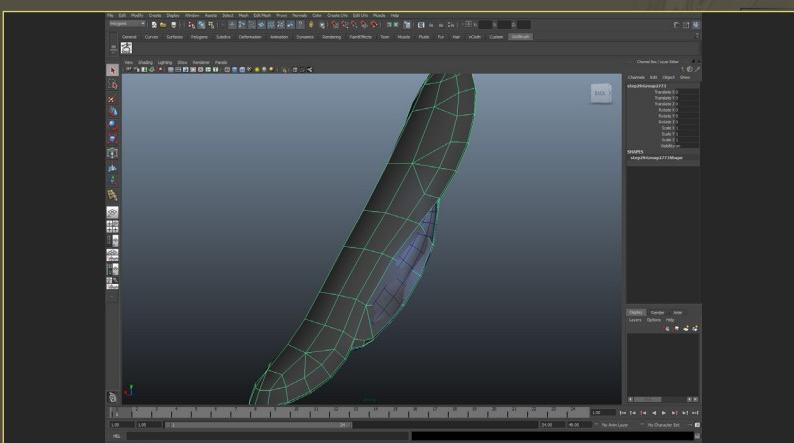


Fig 26

Once the basic shape of the plate is complete, extrude edges on either side and begin building out the smaller plates that conform more to the wrists (Fig.26).

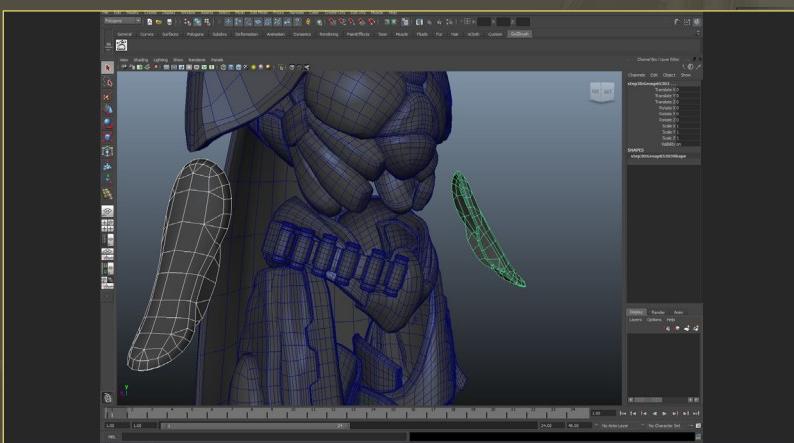


Fig 27

After the side panels have been created for the forearm plates, mirror the model in the X axis. Even though these objects will all remain duplicates - as in they will share the same UV space and textures - I still like to have them in the scene as I continue to work, as it helps give a better idea of how high my triangle count is getting (Fig.27).

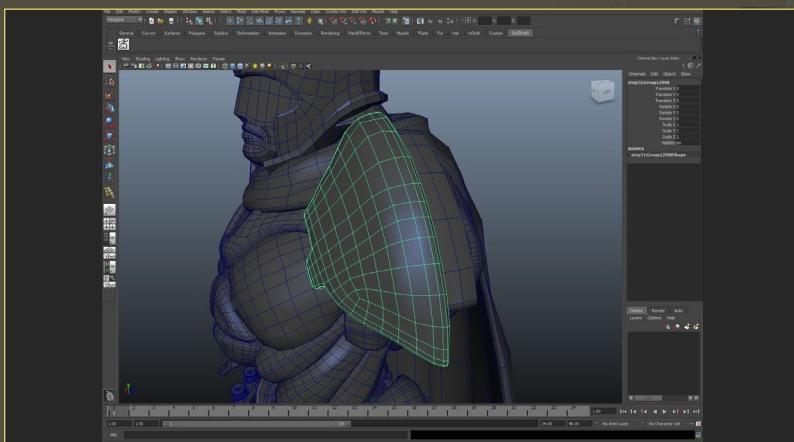
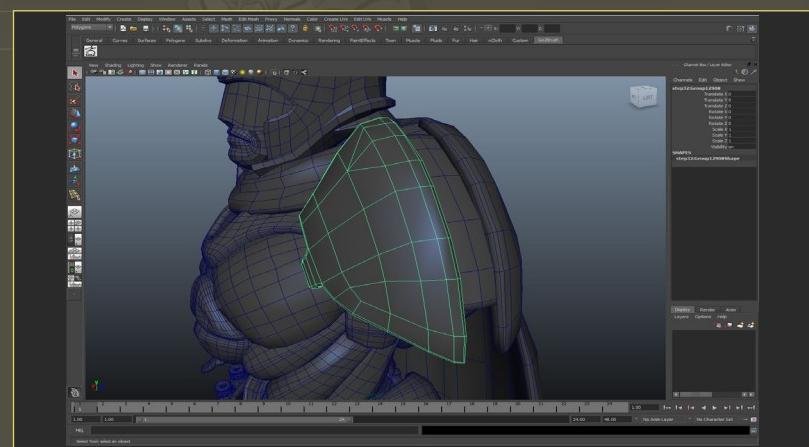


Fig 28

Moving on to the character's left shoulder pad, we will be using the same technique as we did on the right shoulder, except for the fact that this one has a panel running down the middle that will be handled as a separate element in the model (Fig.28).

Simply remove edges and try to devote as many edges as you can to keep the silhouette of the sculpt and retain that nice smooth profile you had in the high resolution version. Once one half is complete, mirror it in the Y axis to complete the shoulder pad (Fig.29).

Fig 29



The character's cape is fairly straightforward.

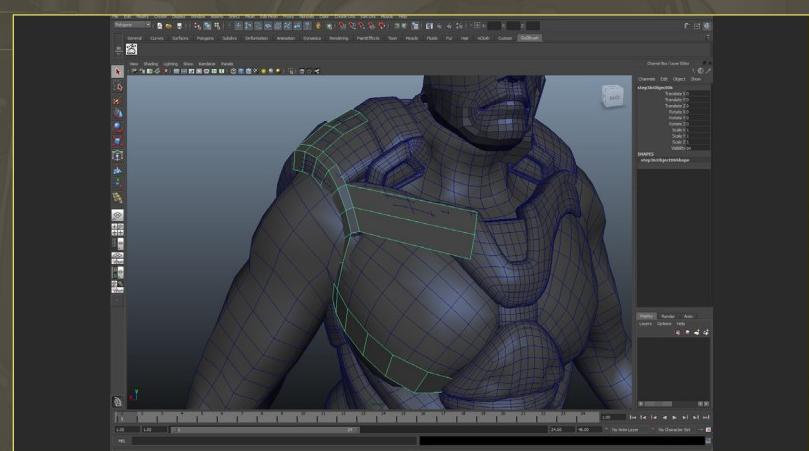
Basically remove any depth in the model and keep the outer shell, then remove a few unneeded edges. Something to keep in mind for cloth like this when using spine bones to control deformation or in game cloth simulation is that the edges need to be as evenly distributed as possible to avoid stretching. If this model was not deforming so freely, it probably could have been created with half of the triangles (Fig.30).

Fig 30



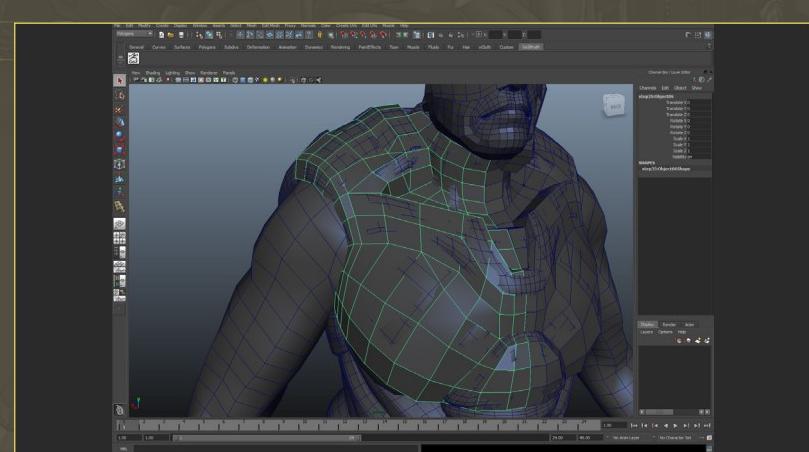
Move on to the chest piece and, ultimately, the beginning of the entire upper torso. Line the trapezius and pectoral areas with an edge ring and build out from there, marking the collar bone section and lower breastplate (Fig.31).

Fig 31



From here it is a matter of blocking out the bigger forms from our high resolution model and connecting them with edges, checking our base model as a guide. Focus on the forms of the collar bone, sternum and breastplate allowing things like seams, bolts and holes to be handled in the Normal map. As you can see in my images I am staying fairly true to the high resolution model, just with simplified geometry (Fig.32).

Fig 32



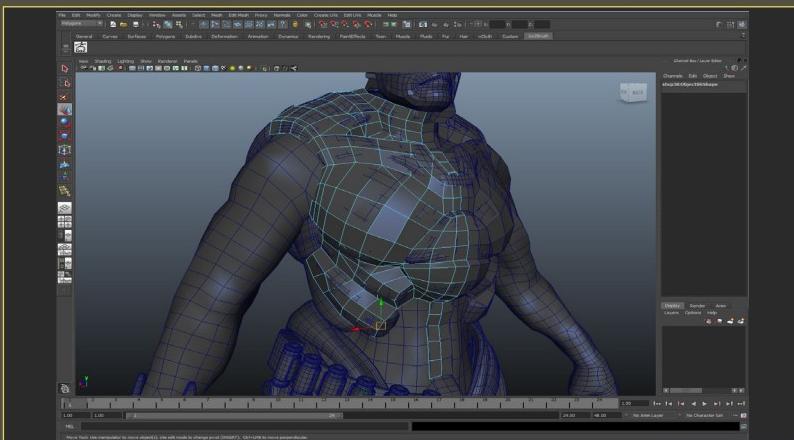


Fig 33

With the chest section of the armor complete, build downwards to include a simplified version of the rib pads, lower portion of the sternum protector and onto the organic section of the stomach under the armor (**Fig.33**).

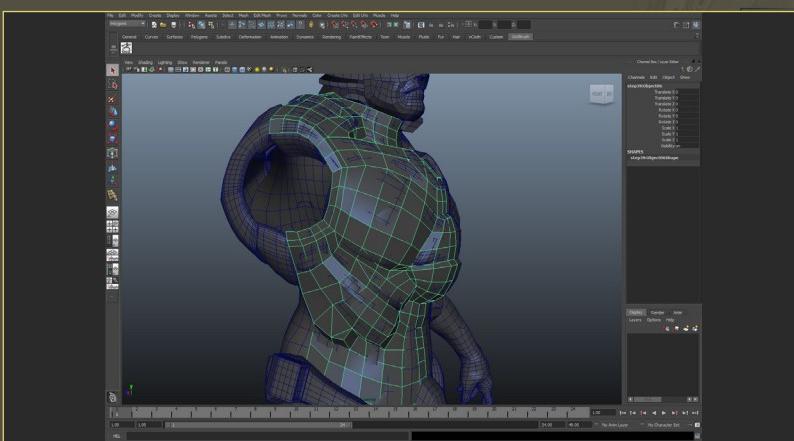


Fig 34

The midsection of the armor is composed of an organic material like rubber and will be where the character deforms most. There will be very little twisting done by this character, so leaving this section unarmored will help with movement. Add a few edge loops circling from the stomach to the back (**Fig.34**).

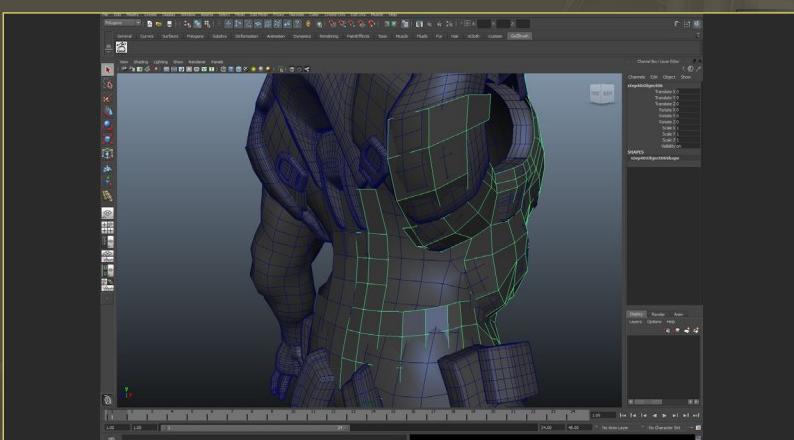


Fig 35

Continuing on to the back of our character, build outwards from the waist and armpit to begin the basic shape of the spine and shoulder blade armor sections (**Fig.35**).

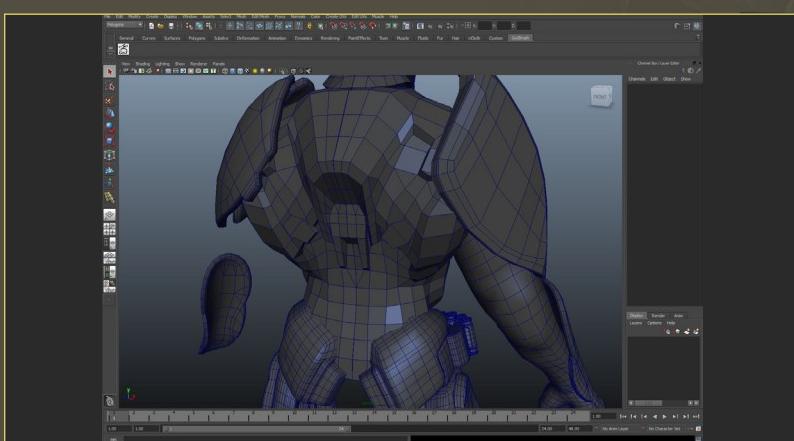
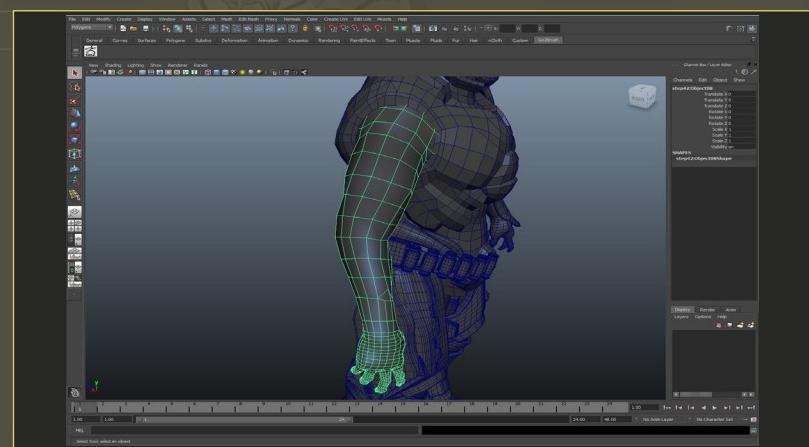


Fig 36

With the major landmarks created for the back armor it's fairly easy to go in and trace where edges need to be dropped down. Focusing on the major shapes like the shoulder blades and back pack sections, we can lay down their shape and fill in areas with bridged edges. Add the hexagon tabs and the tabs connecting to the under armor near the spine. These are mainly just for visual interest. If LOD models (lower resolution models that replace the base model at different distances from the in-game camera) were created, details like this could be removed (**Fig.36**).

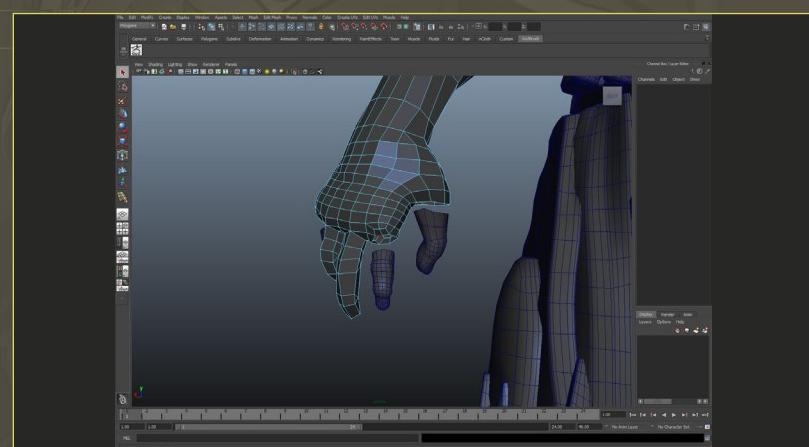
Next, move on to the arm. The ribbing details you created in the high resolution version are gone and you can easily create the bulk of our low resolution version by removing many of the edges. I like to leave a few loops around the character's elbows to retain shape during deformations (**Fig.37**).

Fig 37



For the hands, remove the fingers and begin rebuilding them with edge extrusions from the palm. It's less time-consuming this way, as you essentially just need to extrude the edge to each knuckle and continue on to the next. For each knuckle bevel the top edges and terminate them in a triangle on the side of the finger. This helps keep the final triangle count low and will be good for deformations as the single edge at the back of the knuckle will collapse, while the two edges on the top of the knuckle will retain the shape (**Fig.38**).

Fig 38



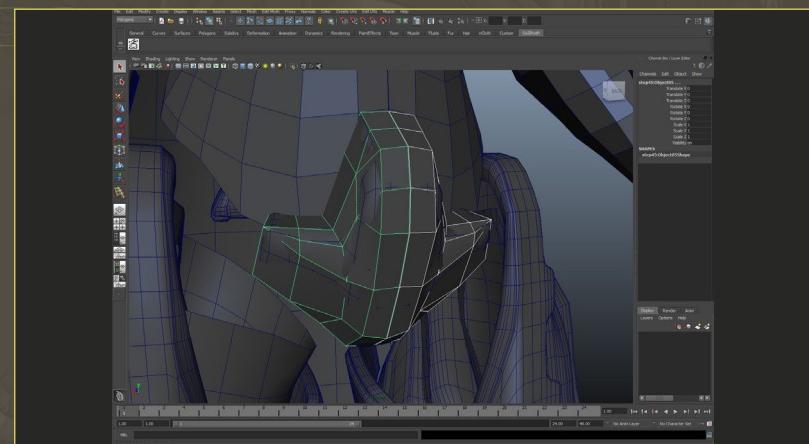
With the fingers complete reduce the hand geometry by removing a few edge rings and mirror the entire arm on the X axis (**Fig.39**).

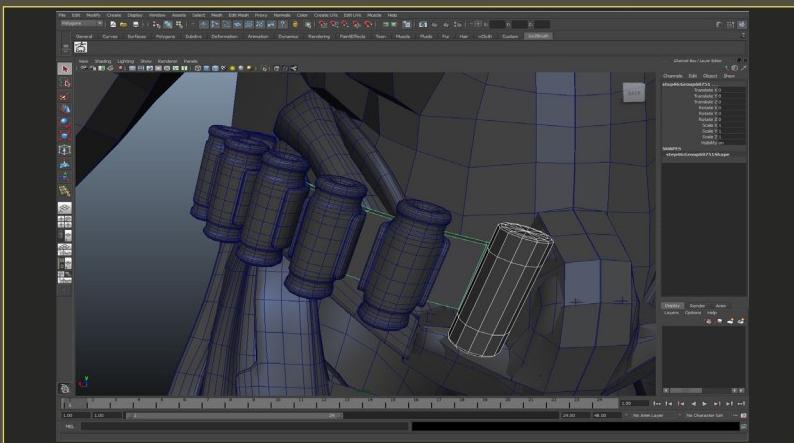
Fig 39



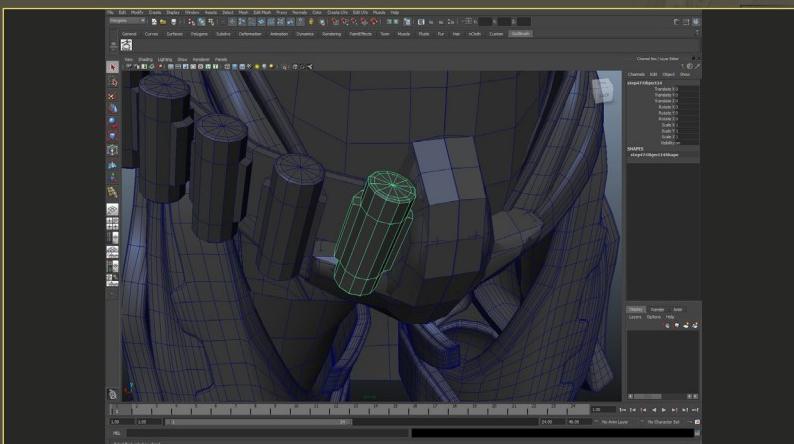
Next, move on to the armored codpiece. For this piece of armor I simply created a plane and modeled it from scratch using the base model as a guide (**Fig.40**).

Fig 40

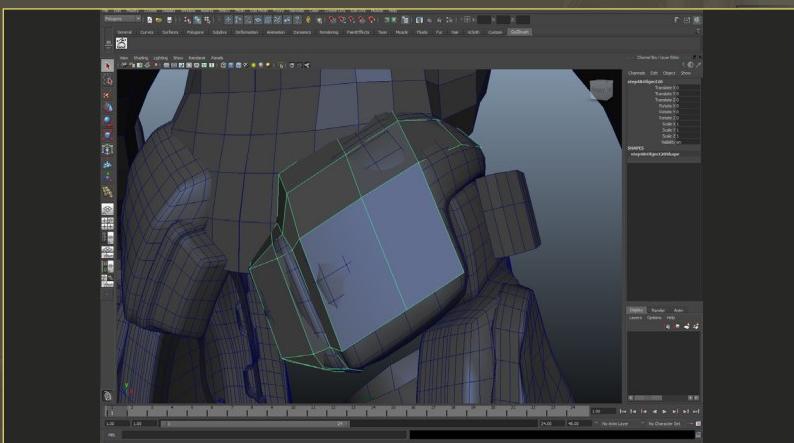



Fig 41

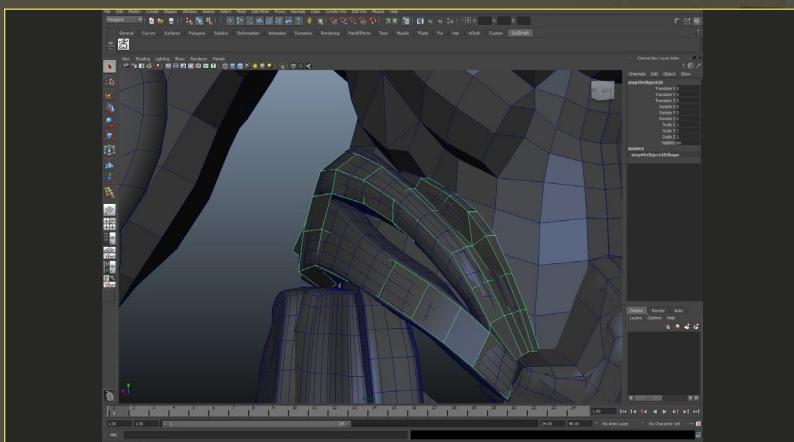
Moving on to the belt, simply remove a few horizontal edges from the base model and that's it. The grenades, on the other hand, take a little more work. To begin, extract the top ring on the grenade closest to the codpiece and extrude the boundary downwards to cover the entire grenade shape, leaving two horizontal edges to mark the extruded tab (Fig.41).


Fig 42

Next grab some faces from the center edge ring and extrude them to cover the tabbed section in the high resolution model. Bevel the top and bottom edges of the grenade so their profile is softer. On an LOD model these details would probably be among the first to be reduced, but since this model is mostly regarded as a portfolio piece this luxury will make the final presentation slightly better.


Fig 43

As you can see, all of the grenades are instances of the original one, which is closest to the codpiece. They will remain this way until the end to save UV space. When the time comes to bake Normal and Ambient Occlusion maps, simply use the original grenade and all of the information gathered from that will be carried over to the duplicate grenades (Fig.42).

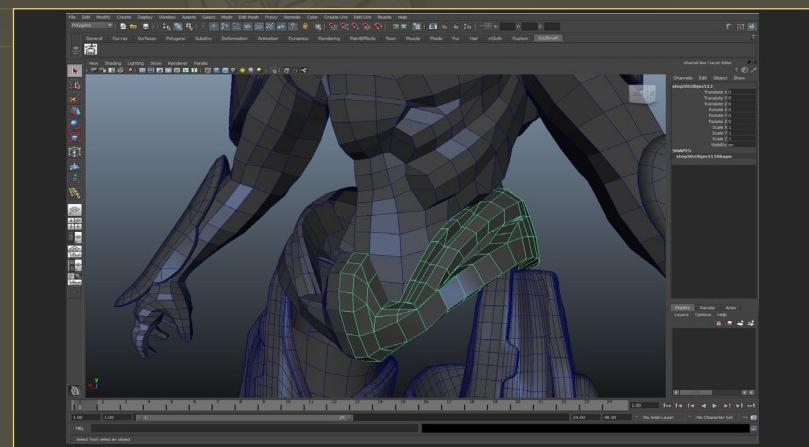

Fig 44

Move on to the hip armor and begin by blocking out the larger panel on the buttock section of the character. It is important here to mark the edges of the large bevels in the high resolution model, specifically towards the character's rib cage, as we will need to continue these edges to the front of the character (Fig.43).

Continue the edges from the back panel towards the front, following the strong edges of the wider bevels created in the high resolution model. At this stage you can begin to mark the "hole" that reveals the character's under armor, as well as the inner hip panel that would represent the character's pelvis (Fig.44).

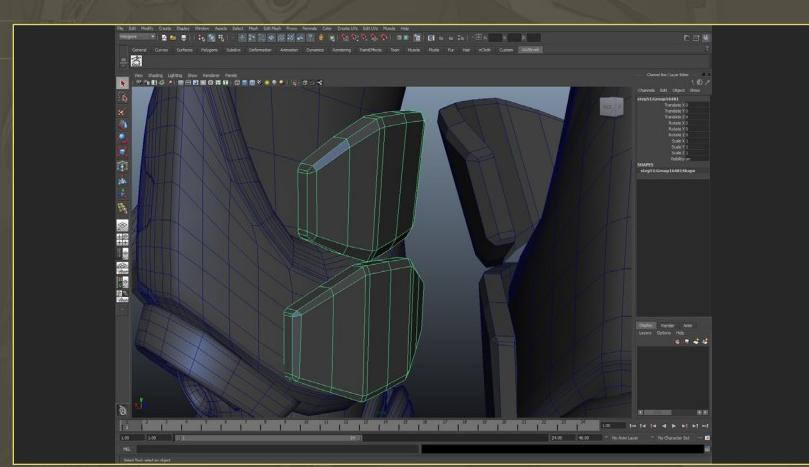
In **Fig.45** you can see the completed model, which is one continuous mesh. Merge it into the codpiece armor as it will be easier to handle this during the weighting and rigging process.

Fig 45



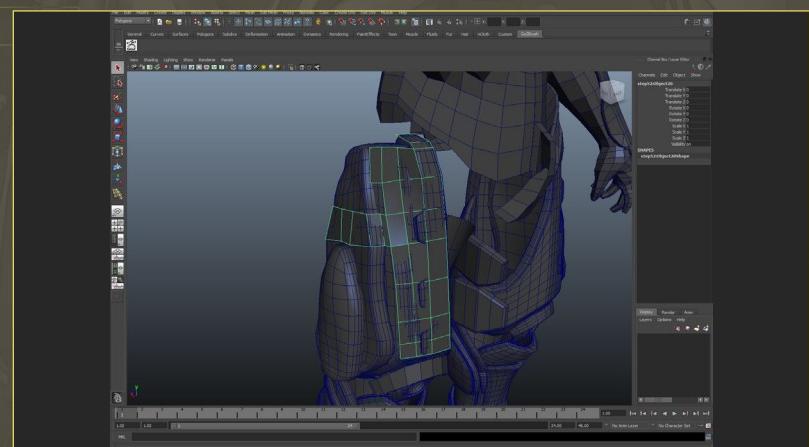
For the floating leg armor panels on the character's thighs, remove the edges that you no longer need. Do this by marking the far corners of the model and the extrusion at the center of the armor panel (**Fig.46**).

Fig 46



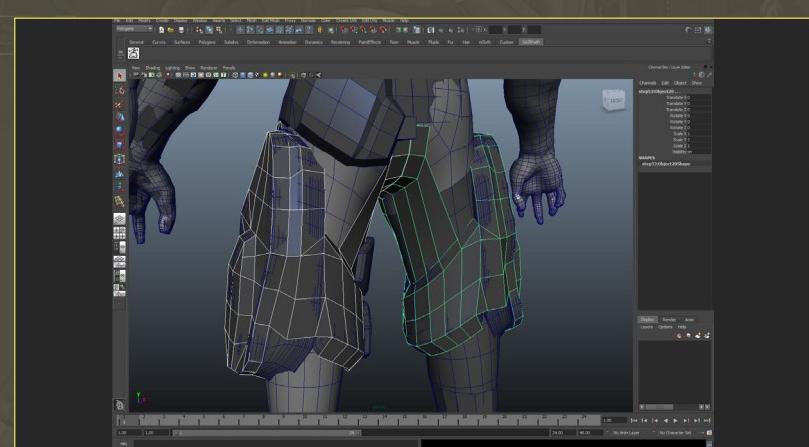
Next, move on to the upper leg armor. Although this was a complicated model in the high resolution version, it is made much easier in the low poly version since we can practically trace the outer boundaries and work from there. To retain the shape of the knee pad rim, simply remove edges from the base model (**Fig.47**).

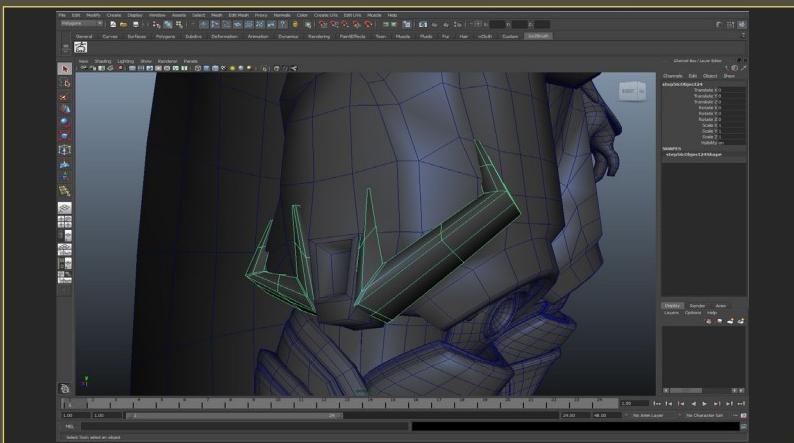
Fig 47



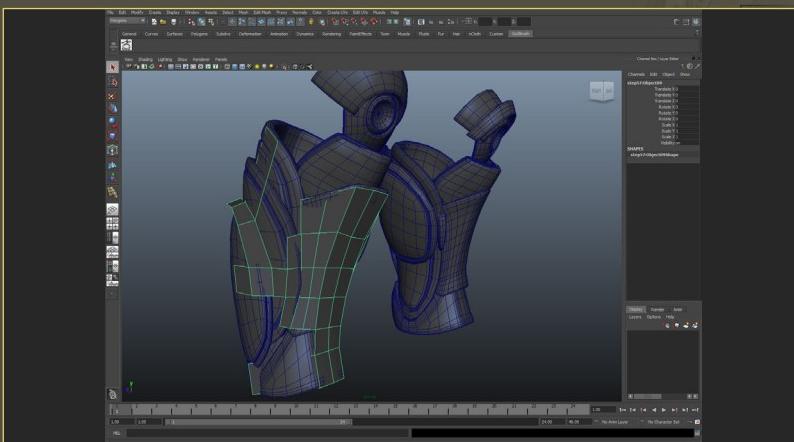
The entire upper leg section is going to consist of one model, with the knee section being separate as well as the shin and then the foot armor sections. For the upper leg it is important to lay out the bigger shapes we achieved in the high resolution version, such as the outer limits of the leg armor that circles around the leg itself and the dome object on the outside of the leg. Once these are laid out, build up towards the character's crotch by marking out the character's thighs using the base model as a guide (**Fig.48**).

Fig 48

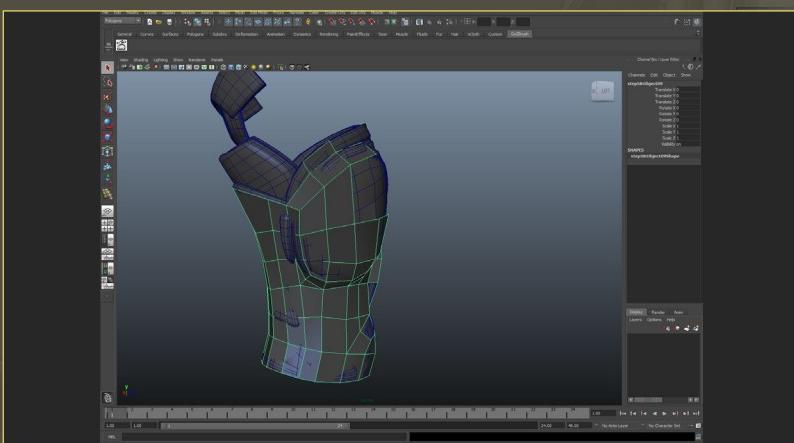



Fig 49

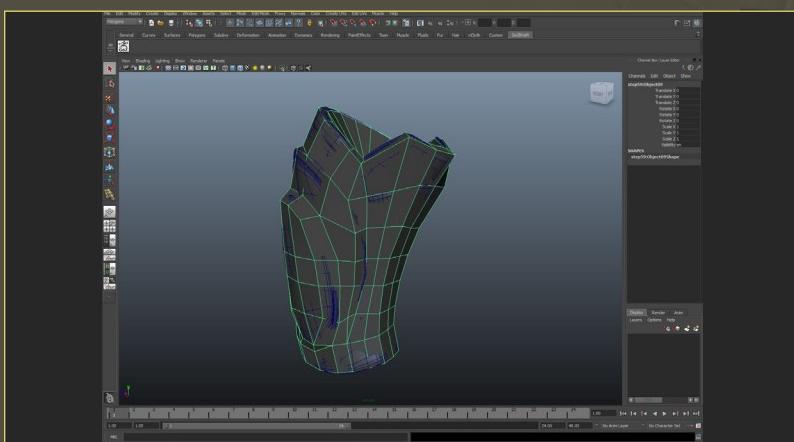
For the angular brackets on the outer leg armor, make them as separate objects as it is easier to handle them that way. Create them by removing unnecessary edges and by retaining the far corners of the model to keep that nice rigid shape we had in the high resolution version of the model (**Fig.49**).


Fig 50

Next is the lower leg armor. Due to the nature of the high resolution model, we can use the shin as an anchor point of the model, but will need to build out each side as the panels are slightly askew. Build out the shin pad and work from there, starting with the right side of the lower leg, marking the extreme points of the model, which you can begin to fill in (**Fig.50**).


Fig 51

From here move on to the simpler, opposite side of the lower leg. The key element here is the plate that protects the calf muscle, otherwise the model is fairly straightforward and cylindrical (**Fig.51**).


Fig 52

Bring it all together and bridge the two halves. Cap the top of the lower leg armor by extruding all of the edges in, making sure to build the back faces of the top of the shin plate, and merging them down to just one vertex. Also add support edges where needed, like where the top of the second panel will be to help keep the model profile the same as this high resolution version (**Fig.52**).

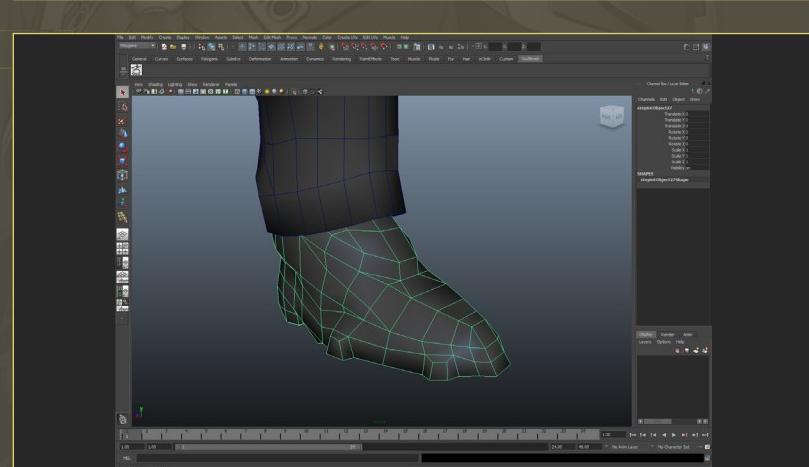
For the midsection that makes up the knee and leg under armor, take the base model of the leg, remove the faces that will always be covered by the armor plates and extrude some of the faces, pushing and pulling vertices to match where the knee pad armor will be. This section will also need to be able to deform when the leg bends, so make sure you have a few loops circling the entire leg near the knee to support this (Fig.53).

Fig 53



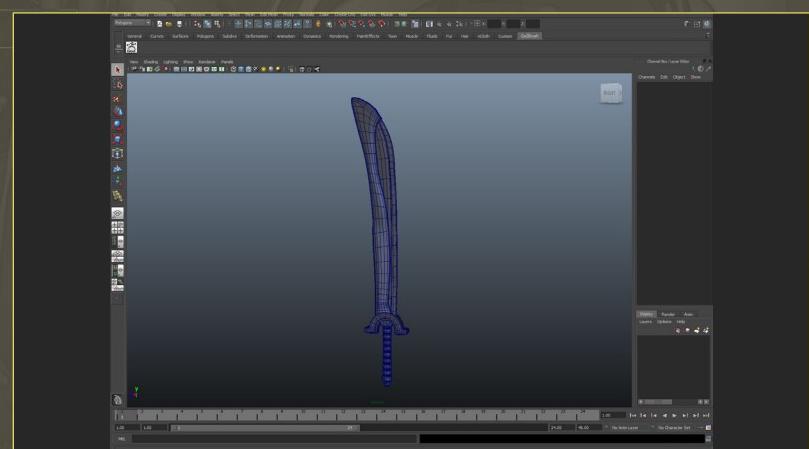
To finish off the character, extract a few faces from the boot itself to begin building out from there, incorporating elements like the armor at the top of the foot and the nubs on the side of the foot that add some visual interest. Keep areas like this fairly low frequency in detail as it is an area that isn't usually seen by the player of a video game or, at the very least, focused on. The final triangle count for the character, including the cape and grenades, is 16,202. This is a touch high, but given the nature of this character I feel that it is acceptable (Fig.54).

Fig 54



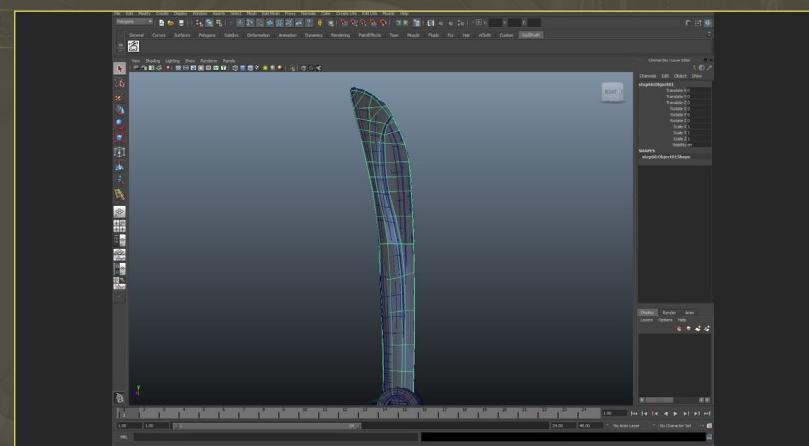
Moving on to the character's sword, begin as you did with the character itself. Import the lowest subdivision from ZBrush so you have a pretty solid starting point for your low resolution model. You have to think of the weapons as if they are simply character accessories that could be swapped in and out or upgraded along the way. This means lower triangle counts and both weapons occupying one texture sheet. If these were intended to be first person weapons, the budgets would be a bit higher (Fig.55).

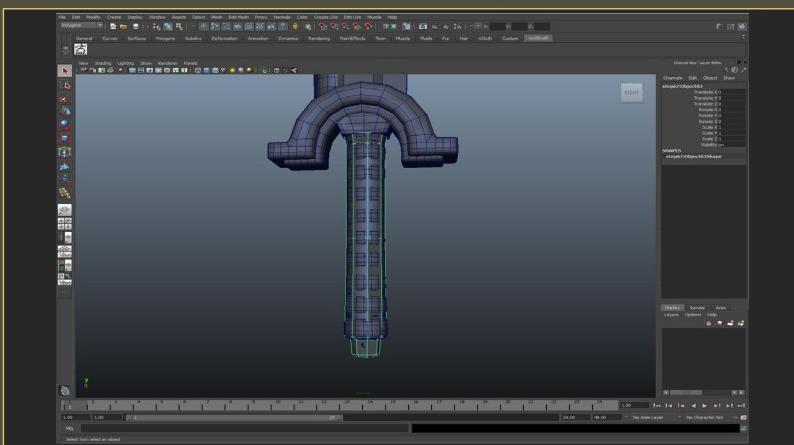
Fig 55



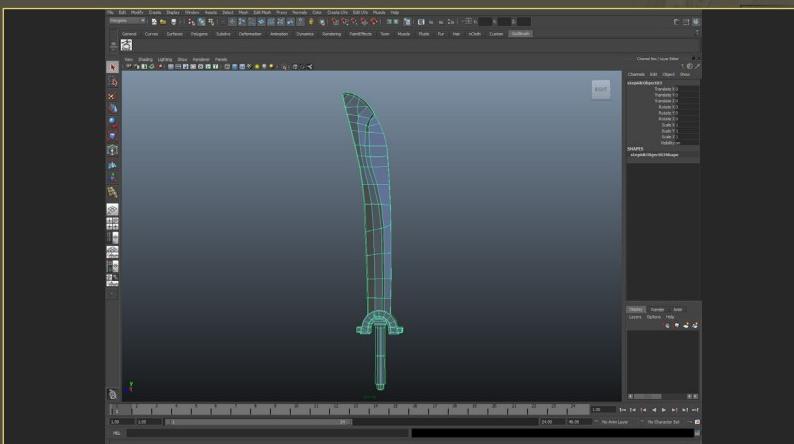
The entire blade of the sword will be one solid mesh. The actual blades - the parts that would do the cutting - will more or less be simplified down to a box (a plane on each side and connected down the middle with a face) with the outer side of the sword retaining its thickness and the nice smooth curve we created to give the model some visual interest (Fig.56).

Fig 56

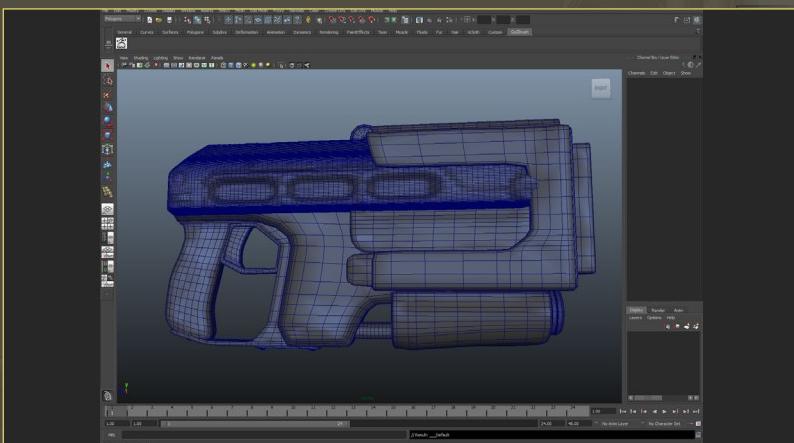



Fig 57

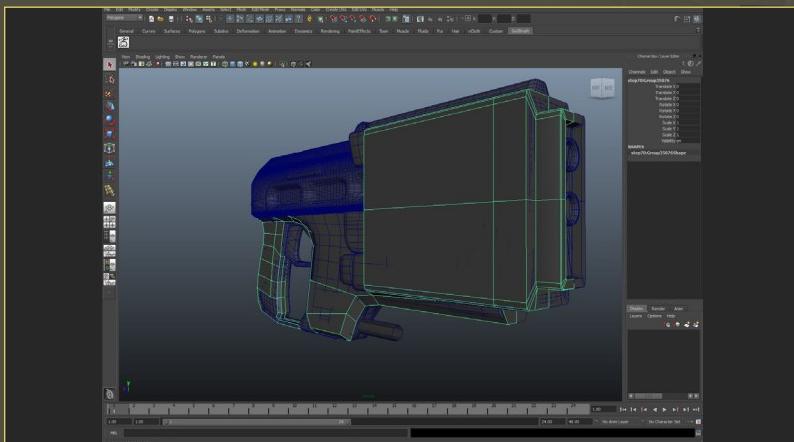
The handle for the sword (which will most likely be hidden by the character's hand) is a simple cylinder that fans out towards the top and incorporates the metallic cap towards the bottom (**Fig.57**).


Fig 58

For the circular hilt take the top portion and reduce the edges significantly, grabbing some of the inner faces and extruding them outwards to create the same layering effect we have in our high resolution model. The connector between the hilt and handle is just a reduced version of the original, removing any bevels and keeping the shape fairly simple but still achieving the same rough shape we have in our sculpt. The final triangle count for the sword is 996 triangles (**Fig.58**).


Fig 59

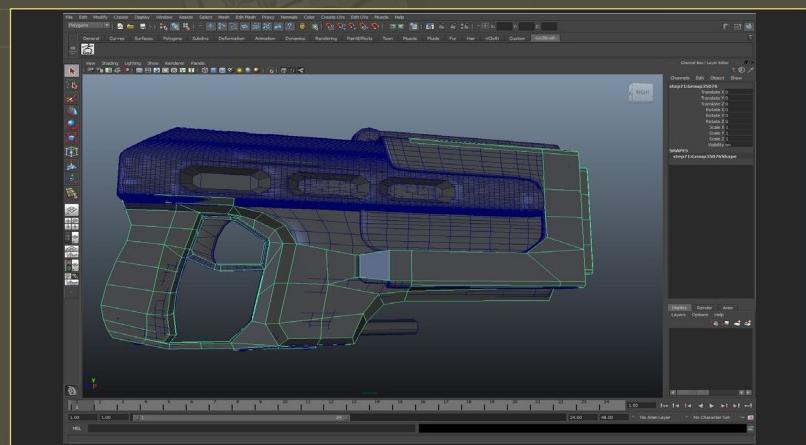
Finally, move on to the character's gun. Like with the sword and the character itself, bring in the lowest subdivisions from ZBrush (**Fig.59**).


Fig 60

For most of the gun you can grab the front bracket of the gun, reduce its edges and build out from there, more or less creating the rough shape of the gun. Much like the sword, and to a certain extent many elements of the character, the gun doesn't need to deform. The key thing to keep in mind is how the low poly version will bake using the high resolution version as a target while keeping the overall triangle count at a minimum (**Fig.60**).

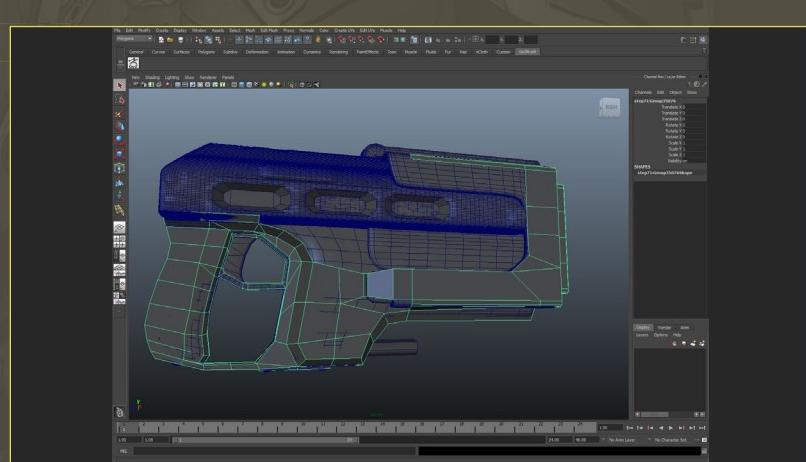
After blocking in the body of the gun, cut in a few edges and begin to build in the rough shape of the gun's inner panels (Fig.61).

Fig 61



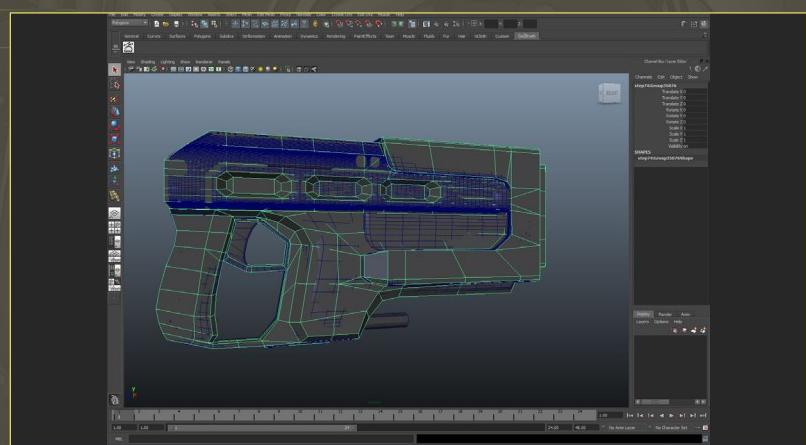
Most of the gun is more or less on the same plane of depth, though the holes towards the top of the gun are fairly deep and need geometry to support them. To keep everything even create one hole and duplicate the model twice, positioning each one to line up with the high resolution version (Fig.62).

Fig 62



Next build out the rest of the gun by bridging these landmarks together. To help catch light and again, be slightly more visually interesting for display, retain the definition between the inner and outer panels of the gun (Fig.63).

Fig 63



To finish off the character's gun, remove many of the edges from the front grip and create the rails and top cylinder by removing faces and edges that add nothing to the gun's silhouette. The final triangle count for the gun is 2,301 (Fig.64).

Fig 64



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